

# Service Service Service



# Service Manual

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# 1. Technical Specifications, Connections, and Chassis Overview

## Index of this chapter:

- 1.1 Technical Specifications
- 1.2 Connection Overview
- 1.3 Chassis Overview

## Notes:

- Figures can deviate due to the different set executions.
- Specifications are indicative (subject to change).

## 1.1 Technical Specifications

### 1.1.1 Vision

|                                        |                        |
|----------------------------------------|------------------------|
| Display type                           | : Plasma               |
| Screen size                            | : 42" (107 cm), 16:9   |
|                                        | : 50" (127 cm), 16:9   |
| Resolution (HxV pixels)                | : 1024x768 (42")       |
|                                        | : 1366x768 (50")       |
| Dyn. contrast ratio                    | : 15000:1              |
| Min. light output (cd/m <sup>2</sup> ) | : 1500 (42")           |
|                                        | : 1300 (50")           |
| Typ. response time (ms)                | : 3                    |
| Viewing angle (HxV degrees)            | : 160x160              |
| Tuning system                          | : PLL                  |
| Presets/channels                       | : 100 presets          |
| Tuner bands                            | : VHF, UHF, S, H       |
| TV Colour systems                      | : PAL B/G, D/K, I      |
|                                        | : SECAM B/G, D/K, L/L' |
|                                        | : DVB-T COFDM          |
| Video playback                         | : NTSC                 |
|                                        | : PAL                  |
|                                        | : SECAM                |
| Supported computer formats             | : 640x480              |
|                                        | (@ 60, 72, 75, 85 Hz)  |
|                                        | : 800x600              |
|                                        | (@ 60, 72, 75, 85 Hz)  |
|                                        | : 1024x768             |
|                                        | (@ 60, 72, 75, 85 Hz)  |
| Supported video formats                | : 640x480i - 1fH       |
|                                        | : 720x576i - 1fH       |
|                                        | : 640x480p - 2fH       |
|                                        | : 720x576p - 2fH       |
|                                        | : 1920x1080i - 2fH     |
|                                        | : 1280x720p - 3fH      |

### 1.1.2 Sound

|                                   |                        |
|-----------------------------------|------------------------|
| Sound systems                     | : 2CS B/G, D/K         |
|                                   | : NICAM B/G, D/K, I, L |
| Maximum power (W <sub>RMS</sub> ) | : 2 x 10               |

### 1.1.3 Miscellaneous

#### Power supply:

|                                    |             |
|------------------------------------|-------------|
| - Mains voltage (V <sub>AC</sub> ) | : 220 - 240 |
| - Mains frequency (Hz)             | : 50 / 60   |

#### Ambient conditions:

|                          |             |
|--------------------------|-------------|
| - Temperature range (°C) | : +5 to +40 |
| - Maximum humidity       | : 90% R.H.  |

#### Power consumption (values are indicative)

|                        |               |
|------------------------|---------------|
| - Normal operation (W) | : ≈ 250 (42") |
|                        | : ≈ 360 (50") |
| - Stand-by (W)         | : < 1         |

#### Dimensions (WxHxD cm)

|            |                   |
|------------|-------------------|
| - 42" sets | : 104.7x70.1x10.7 |
| - 50" sets | : 125.0x81.9x10.8 |

#### Weight (kg)

|            |                      |
|------------|----------------------|
| - 42" sets | : 31.5 (excl. stand) |
|            | : 41.5 (incl. stand) |
| - 50" sets | : 47.5 (excl. stand) |
|            | : 57.5 (incl. stand) |

## 1.2 Connection Overview

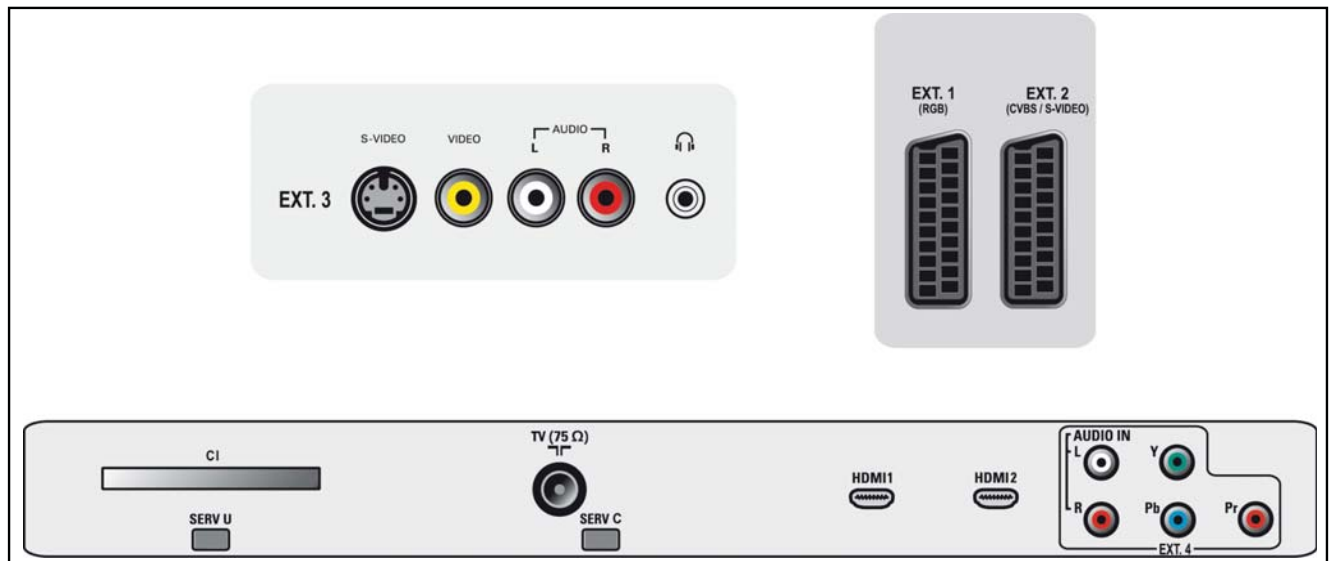
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Figure 1-1 Side and rear I/O connections

**Note:** The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

### 1.2.1 Side Connections

#### EXT3: S-Video (Hosiden): Video Y/C - In

|              |                              |   |
|--------------|------------------------------|---|
| 1 - Ground Y | Gnd                          | ⊥ |
| 2 - Ground C | Gnd                          | ⊥ |
| 3 - Video Y  | 1 V <sub>PP</sub> / 75 ohm   | ⊕ |
| 4 - Video C  | 0.3 V <sub>PP</sub> / 75 ohm | ⊕ |

#### EXT3: Cinch: Video CVBS - In, Audio - In

|                 |                                |   |
|-----------------|--------------------------------|---|
| Rd - Audio R    | 0.5 V <sub>RMS</sub> / 10 kohm | ⊕ |
| Wh - Audio L    | 0.5 V <sub>RMS</sub> / 10 kohm | ⊕ |
| Ye - Video CVBS | 1 V <sub>PP</sub> / 75 ohm     | ⊕ |

#### EXT3: Head phone - Out

|                 |                      |   |
|-----------------|----------------------|---|
| Bk - Head phone | 32 - 600 ohm / 10 mW | ⊕ |
|-----------------|----------------------|---|

### 1.2.2 Rear Connections

#### EXT1: Video RGB - In, CVBS - In/Out, Audio - In/Out

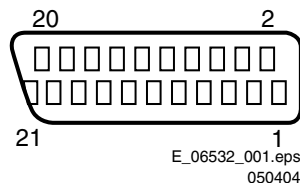
E\_06532\_001.eps  
050404

Figure 1-2 SCART connector

|                  |                                |   |
|------------------|--------------------------------|---|
| 1 - Audio R      | 0.5 V <sub>RMS</sub> / 1 kohm  | ⊕ |
| 2 - Audio R      | 0.5 V <sub>RMS</sub> / 10 kohm | ⊕ |
| 3 - Audio L      | 0.5 V <sub>RMS</sub> / 1 kohm  | ⊕ |
| 4 - Ground Audio | Gnd                            | ⊥ |
| 5 - Ground Blue  | Gnd                            | ⊥ |
| 6 - Audio L      | 0.5 V <sub>RMS</sub> / 10 kohm | ⊕ |
| 7 - Video Blue   | 0.7 V <sub>PP</sub> / 75 ohm   | ⊕ |

|                     |                                                            |   |
|---------------------|------------------------------------------------------------|---|
| 8 - Function Select | 0 - 2 V: INT<br>4.5 - 7 V: EXT 16:9<br>9.5 - 12 V: EXT 4:3 | ⊕ |
| 9 - Ground Green    | Gnd                                                        | ⊥ |
| 10 - Easylink P50   | 0 - 5 V / 4.7 kohm                                         | ⊕ |
| 11 - Video Green    | 0.7 V <sub>PP</sub> / 75 ohm                               | ⊕ |
| 12 - n.c.           |                                                            |   |
| 13 - Ground Red     | Gnd                                                        | ⊥ |
| 14 - Ground P50     | Gnd                                                        | ⊥ |
| 15 - Video Red      | 0.7 V <sub>PP</sub> / 75 ohm                               | ⊕ |
| 16 - Status/FBL     | 0 - 0.4 V: INT<br>1 - 3 V: EXT / 75 ohm                    | ⊕ |
| 17 - Ground Video   | Gnd                                                        | ⊥ |
| 18 - Ground FBL     | Gnd                                                        | ⊥ |
| 19 - Video CVBS     | 1 V <sub>PP</sub> / 75 ohm                                 | ⊕ |
| 20 - Video CVBS     | 1 V <sub>PP</sub> / 75 ohm                                 | ⊕ |
| 21 - Shield         | Gnd                                                        | ⊥ |

#### EXT2: Video YC - In, CVBS - In/Out, Audio - In/Out

|                     |                                                            |   |
|---------------------|------------------------------------------------------------|---|
| 1 - Audio R         | 0.5 V <sub>RMS</sub> / 1 kohm                              | ⊕ |
| 2 - Audio R         | 0.5 V <sub>RMS</sub> / 10 kohm                             | ⊕ |
| 3 - Audio L         | 0.5 V <sub>RMS</sub> / 1 kohm                              | ⊕ |
| 4 - Ground Audio    | Gnd                                                        | ⊥ |
| 5 - n.c.            |                                                            |   |
| 6 - Audio L         | 0.5 V <sub>RMS</sub> / 10 kohm                             | ⊕ |
| 7 - C-out           | 0.7 V <sub>PP</sub> / 75 ohm                               | ⊕ |
| 8 - Function Select | 0 - 2 V: INT<br>4.5 - 7 V: EXT 16:9<br>9.5 - 12 V: EXT 4:3 | ⊕ |
| 9 - n.c.            |                                                            |   |
| 10 - Easylink P50   | 0 - 5 V / 4.7 kohm                                         | ⊕ |
| 11 - n.c.           |                                                            |   |
| 12 - n.c.           |                                                            |   |
| 13 - n.c.           |                                                            |   |
| 14 - Ground P50     | Gnd                                                        | ⊥ |
| 15 - C              | 0.7 V <sub>PP</sub> / 75 ohm                               | ⊕ |
| 16 - Status/FBL     | 0 - 0.4 V: INT<br>1 - 3 V: EXT / 75 ohm                    | ⊕ |
| 17 - Ground Video   | Gnd                                                        | ⊥ |
| 18 - Ground FBL     | Gnd                                                        | ⊥ |
| 19 - Video CVBS     | 1 V <sub>PP</sub> / 75 ohm                                 | ⊕ |
| 20 - Video CVBS/Y   | 1 V <sub>PP</sub> / 75 ohm                                 | ⊕ |
| 21 - Shield         | Gnd                                                        | ⊥ |

**Common Interface**

68p - See diagram B03C

**Service Connector (UART)**

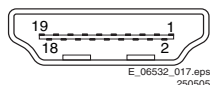
|   |           |          |
|---|-----------|----------|
| 1 | - UART_TX | Transmit |
| 2 | - Ground  | Gnd      |
| 3 | - UART_RX | Receive  |

**Aerial - In**

- - IEC-type (EU) Coax, 75 ohm

**Service Connector (ComPair)**

|   |          |                                  |
|---|----------|----------------------------------|
| 1 | - SDA-S  | I <sup>2</sup> C Data (0 - 5 V)  |
| 2 | - SCL-S  | I <sup>2</sup> C Clock (0 - 5 V) |
| 3 | - Ground | Gnd                              |

**HDMI 1 & 2: Digital Video, Digital Audio - In****Figure 1-3 HDMI (type A) connector**

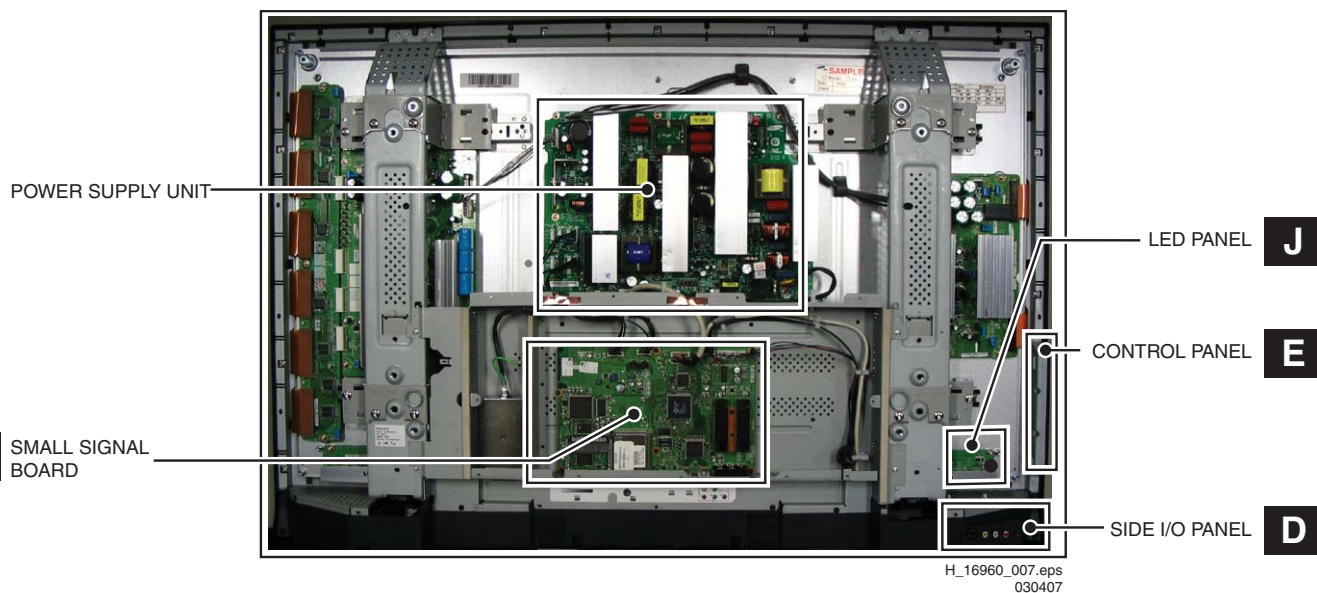
|   |          |              |
|---|----------|--------------|
| 1 | - D2+    | Data channel |
| 2 | - Shield | Gnd          |



|    |           |                 |
|----|-----------|-----------------|
| 3  | - D2-     | Data channel    |
| 4  | - D1+     | Data channel    |
| 5  | - Shield  | Gnd             |
| 6  | - D1-     | Data channel    |
| 7  | - D0+     | Data channel    |
| 8  | - Shield  | Gnd             |
| 9  | - D0-     | Data channel    |
| 10 | - CLK+    | Data channel    |
| 11 | - Shield  | Gnd             |
| 12 | - CLK-    | Data channel    |
| 13 | - n.c.    |                 |
| 14 | - n.c.    |                 |
| 15 | - DDC_SCL | DDC clock       |
| 16 | - DDC_SDA | DDC data        |
| 17 | - Ground  | Gnd             |
| 18 | - +5V     |                 |
| 19 | - HPD     | Hot Plug Detect |
| 20 | - Ground  | Gnd             |

**EXT4: Cinch: Video YPbPr - In, Audio - In**

|    |            |                                |
|----|------------|--------------------------------|
| Gn | - Video Y  | 1 V <sub>PP</sub> / 75 ohm     |
| Bu | - Video Pb | 0.7 V <sub>PP</sub> / 75 ohm   |
| Rd | - Video Pr | 0.7 V <sub>PP</sub> / 75 ohm   |
| Wh | - Audio L  | 0.5 V <sub>RMS</sub> / 10 kohm |
| Rd | - Audio R  | 0.5 V <sub>RMS</sub> / 10 kohm |

**1.3 Chassis Overview****Figure 1-4 PWB/CBA locations**



## 2. Safety Instructions, Warnings, and Notes

### Index of this chapter:

- 2.1 Safety Instructions
- 2.2 Warnings
- 2.3 Notes

### 2.1 Safety Instructions

Safety regulations require the following **during** a repair:

- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol , only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper function.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only for sets that have a Mains/AC Power isolated power supply):
  1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
  2. Set the Mains/AC Power switch to the "on" position (keep the Mains/AC Power cord unplugged!).
  3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
  4. Switch "off" the set, and remove the wire between the two pins of the Mains/AC Power plug.
- Check the cabinet for defects, to prevent touching of any inner parts by the customer.

### 2.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ) . Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

### 2.3 Notes

#### 2.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground ( $\perp$ ), or hot ground ( $\downarrow$ ), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).

- Where necessary, measure the waveforms and voltages with ( $\sqcap$ ) and without ( $\cancel{\sqcap}$ ) aerial signal. Measure the voltages in the power supply section both in normal operation ( $\textcircled{I}$ ) and in stand-by ( $\textcircled{b}$ ). These values are indicated by means of the appropriate symbols.
- Manufactured under license from Dolby Laboratories. "Dolby", "Pro Logic" and the "double-D symbol", are trademarks of Dolby Laboratories.

#### 2.3.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads ( $\mu$ =  $\times 10^{-6}$ ), nano-farads (n=  $\times 10^{-9}$ ), or pico-farads (p=  $\times 10^{-12}$ ).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (\*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

#### 2.3.3 BGA (Ball Grid Array) ICs

##### Introduction

For more information on how to handle BGA devices, visit this URL: [www.atyourservice.ce.philips.com](http://www.atyourservice.ce.philips.com) (needs subscription, not available for all regions). After login, select "Magazine", then go to "Repair downloads". Here you will find Information on how to deal with BGA-ICs.

##### BGA Temperature Profiles

For BGA-ICs, you **must** use the correct temperature-profile, which is coupled to the 12NC. For an overview of these profiles, visit the website [www.atyourservice.ce.philips.com](http://www.atyourservice.ce.philips.com) (needs subscription, but is not available for all regions) You will find this and more technical information within the "Magazine", chapter "Repair downloads". For additional questions please contact your local repair help desk.

#### 2.3.4 Lead-free Soldering

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able:
  - To reach a solder-tip temperature of at least 400°C.
  - To stabilize the adjusted temperature at the solder-tip.
  - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of around 360°C - 380°C is reached and stabilized at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will increase drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch "off" unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly to

avoid mixed regimes. If this cannot be avoided, carefully clear the solder-joint from old tin and re-solder with new tin.

### 2.3.5 Alternative BOM identification

The **third digit** in the serial number (example: AG2B0335000001) indicates the number of the alternative B.O.M. (Bill Of Materials) that has been used for producing the specific TV set. In general, it is possible that the same TV model on the market is produced with e.g. two different types of displays, coming from two different suppliers. This will then result in sets which have the same CTN (Commercial Type Number; e.g. 28PW9515/12) but which have a different B.O.M. number.

By looking at the third digit of the serial number, one can identify which B.O.M. is used for the TV set he is working with. If the third digit of the serial number contains the number "1" (example: AG1B0335000001), then the TV set has been manufactured according to B.O.M. number 1. If the third digit is a "2" (example: AG2B0335000001), then the set has been produced according to B.O.M. no. 2. ***This is important for ordering the correct spare parts!***

For the third digit, the numbers 1...9 and the characters A...Z can be used, so in total: 9 plus 26 = 35 different B.O.M.s can be indicated by the third digit of the serial number.

**Identification:** The bottom line of a type plate gives a 14-digit serial number. Digits 1 and 2 refer to the production centre (e.g. AG is Bruges), digit 3 refers to the B.O.M. code, digit 4 refers to the Service version change code, digits 5 and 6 refer to the production year, and digits 7 and 8 refer to production week (in example below it is 2006 week 17). The 6 last digits contain the serial number.



Figure 2-1 Serial number (example)

## 3. Directions for Use

You can download this information from the following websites:

<http://www.philips.com/support>

<http://www.p4c.philips.com>

### 2.3.6 Exchanging a Defective PDP

If a PDP has defective or "dead" pixels, do the following:

1. Locate the defective pixels.
2. Indicate their positions by means of a marker (with erasable ink!).
3. Indicate the positions of the defective pixels in the Defects Description Form (DDF), which is published in the PDP manuals.
4. After this, remove the PDP and return it to your Service organisation.

If a PDP has to be removed from the TV set, always keep in mind that the PDP parts can easily be damaged by ESD, so take the following protective measures:

- Do not damage the flex foils (they are located on the left, right, upper and lower sides of the PDP).
- Do not scratch the glass plate.
- Avoid fingerprints.

### 2.3.7 Board Level Repair (BLR) or Component Level Repair (CLR)

If a board is defective, consult your repair procedure to decide if the board has to be exchanged or if it should be repaired on component level.

If your repair procedure says the board should be exchanged completely, do not solder on the defective board. Otherwise, it cannot be returned to the O.E.M. supplier for back charging!

### 2.3.8 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages.** While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

## 4. Mechanical Instructions

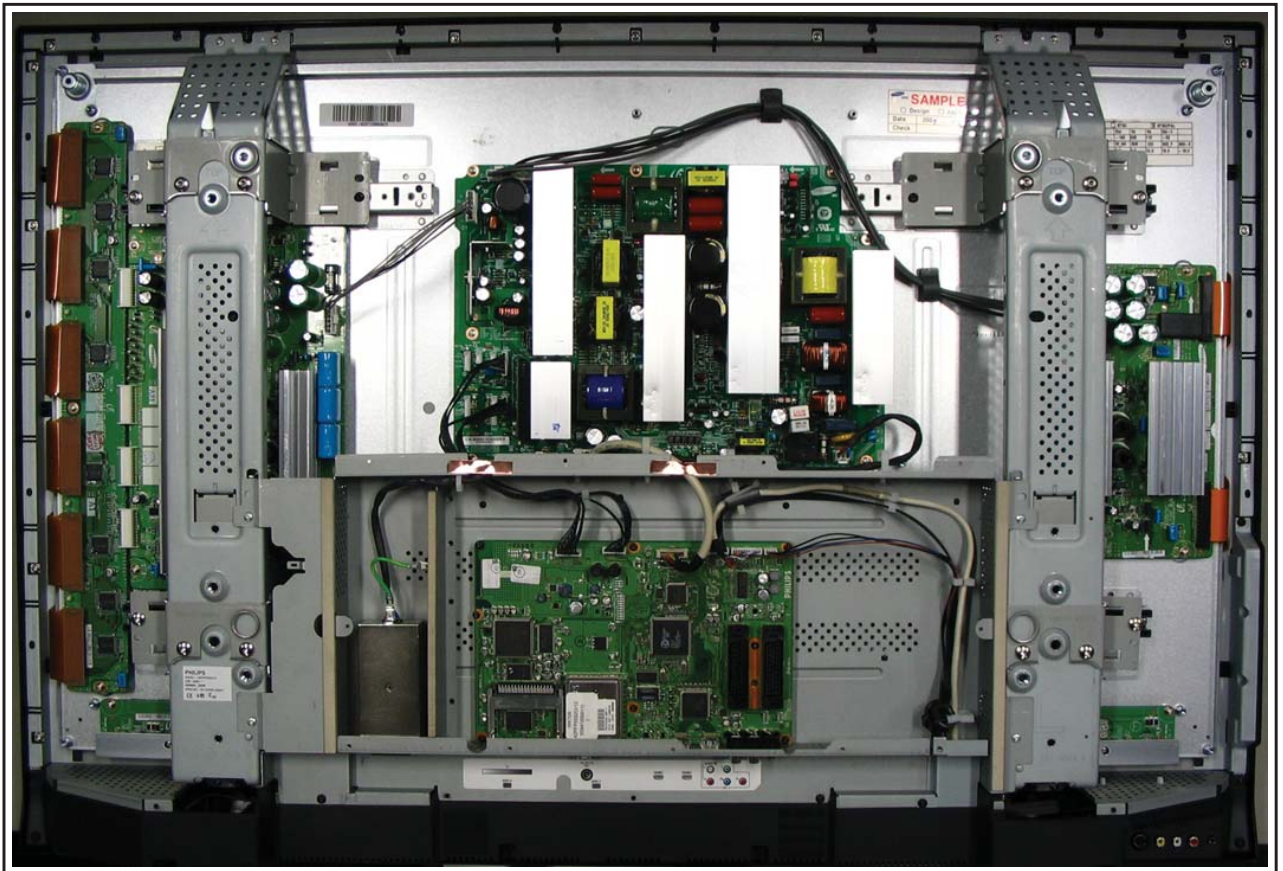
### Index of this chapter:

- 4.1 Cable Dressing
- 4.2 Service Positions
- 4.3 Assy/Panel Removal
- 4.4 Set Re-assembly

### Notes:

- Several models in this chassis range have a different mechanical construction, the instructions given in this chapter are therefore very model specific.
- Follow the disassembly instructions in described order.

### 4.1 Cable Dressing



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030407

Figure 4-1 Cable dressing

## 4.2 Service Positions

For easy servicing of this set, there are a few possibilities created:

- The buffers from the packaging.
- Foam bars (created for Service).
- Aluminium service stands (created for Service).

### 4.2.1 Foam Bars

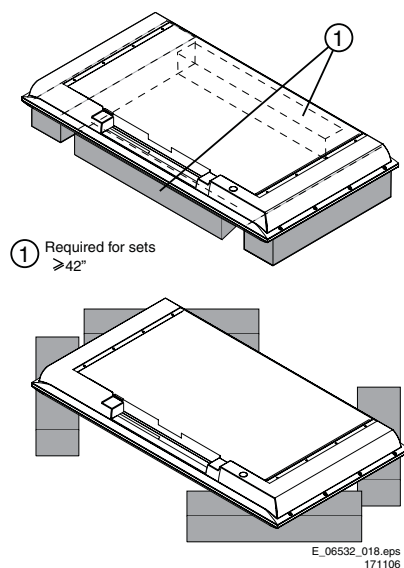


Figure 4-2 Foam bars

The foam bars (order code 3122 785 90580 for two pieces) can be used for all types and sizes of Flat TVs. See figure "Foam bars" for details. Sets with a display of 42" and larger, require **four** foam bars [1]. Ensure that the foam bars are always supporting the cabinet and **never** only the display.

**Caution:** Failure to follow these guidelines can seriously damage the display!

By laying the TV face down on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments. By placing a mirror under the TV, you can monitor the screen.

### 4.2.2 Aluminium Stands

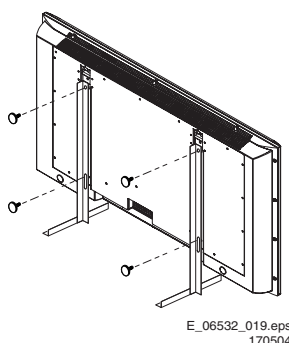


Figure 4-3 Aluminium stands (drawing of MkI)

The new MkII aluminium stands (not on drawing) with order code 3122 785 90690, can also be used to do measurements, alignments, and duration tests. The stands can be (dis)mounted quick and easy by means of sliding them in/out the "mushrooms" (not valid for all models!). The new stands are backwards compatible with the earlier models.

**Important:** For (older) FTV sets without these "mushrooms", it is obligatory to use the provided screws, otherwise it is possible to damage the monitor inside!

## 4.3 Assy/Panel Removal

### 4.3.1 Rear Cover

**Warning:** Disconnect the mains power cord before you remove the rear cover.

1. Place the TV set upside down on a table top, using the foam bars (see part "Service Positions").
2. Remove the stand (if present).
3. Remove T10 Parker screws [1].
4. Remove T10 Tapping screws [2].
5. Remove "mushrooms" [3] and lift the rear cover.

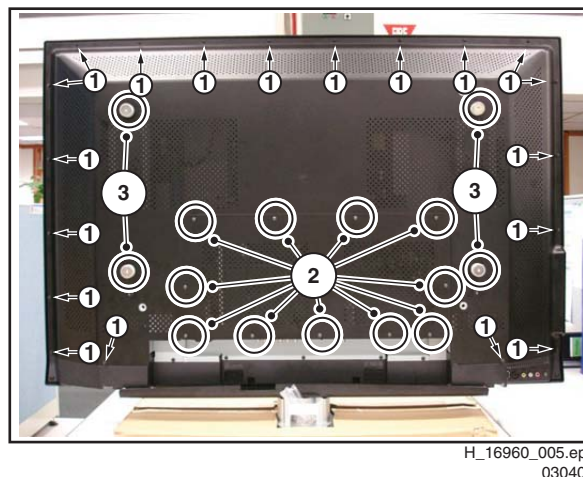


Figure 4-4 Rear cover removal

### 4.3.2 Speaker Cover

1. Remove T10 Parker screws [1].
2. Twist [2] and lift the speaker cover as shown.
3. Now you have access to the speakers, Side I/O panel, IR/LED panel.

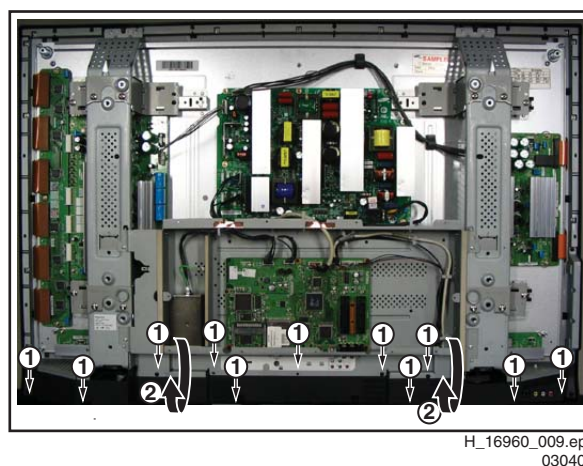
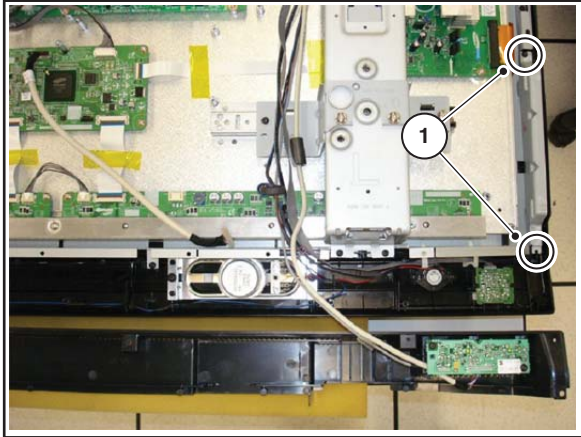


Figure 4-5 Speaker cover removal



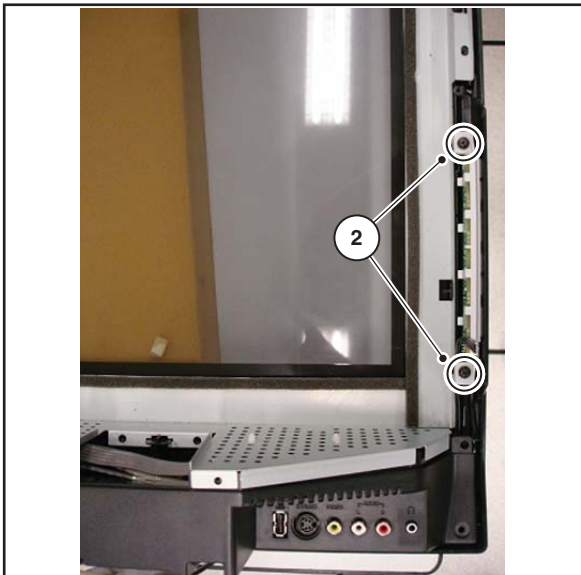
#### 4.3.3 Keyboard Control Panel [E]

1. Refer to next fig. "Keyboard control panel".
  2. Remove the T10 Parker screws [1] from the shielding.
  3. Remove the shielding.
  4. Remove the T10 Parker screws [2] from the bracket.
  5. Remove the unit.
  6. Unplug connector(s).
- When defective, replace the whole unit.



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Figure 4-6 Keyboard control panel [1/2]

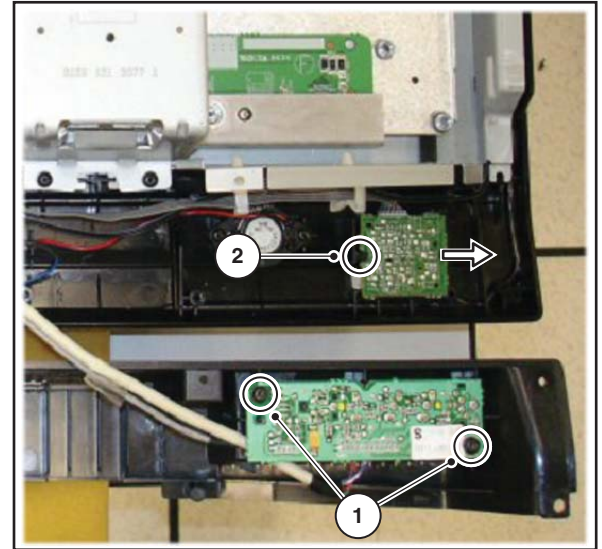


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Figure 4-7 Keyboard control panel [2/2]

#### 4.3.4 Side I/O Panel [D]

1. Remove the bottom "speaker cover", as described earlier.
  2. Refer to next fig. "Side I/O and IR/LED panel".
  3. Remove T10 Parker screws [1] and take out the panel.
- When defective, replace the whole unit.



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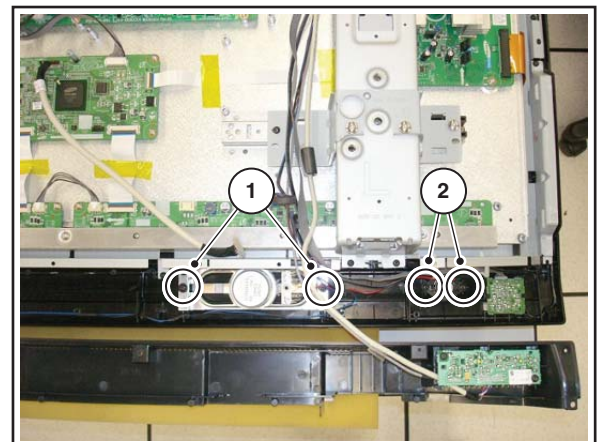
Figure 4-8 Side I/O and IR/LED panel

#### 4.3.5 IR/LED Panel [J]

1. Remove the bottom "speaker cover", as described earlier.
  2. Refer to earlier fig. "Side I/O and IR/LED panel".
  3. Release clip [2] and remove the board.
  4. Unplug connector(s).
- When defective, replace the whole unit.

#### 4.3.6 Speakers

1. Remove the bottom "speaker cover", as described earlier.
2. Refer to fig. "Speakers" below.
3. Unplug connectors.
4. Remove T10 Parker screws [1] and [2].
5. Take out the speaker(s).



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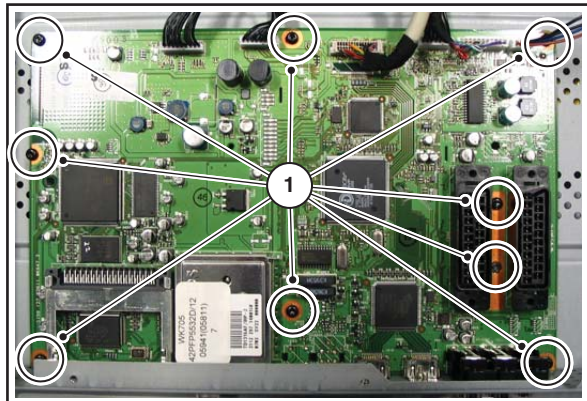
Figure 4-9 Speakers

#### 4.3.7 Power Supply Board

The PSU belongs to the PDP panel. Please refer to the PDP repair manual for more info (info on front page).

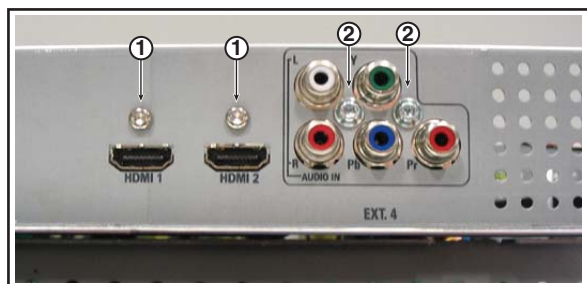
#### 4.3.8 Small Signal Board [B]

1. Unplug all connectors. Carefully unplug the LVDS connector as it is very fragile.
2. Remove the T10 tapping screws [1].
3. Remove the T10 parker screws [2].
4. Take out the panel.



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Figure 4-10 Small Signal Board -1-

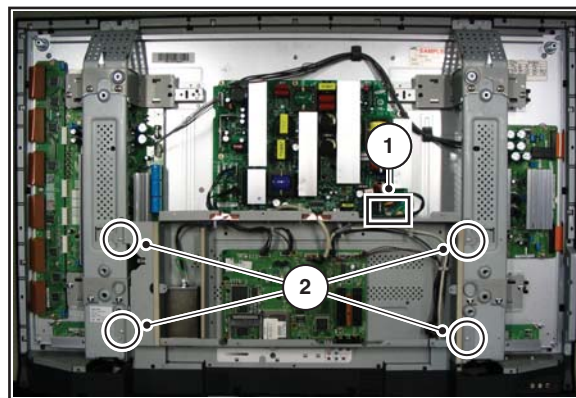


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Figure 4-11 Small Signal Board -2-

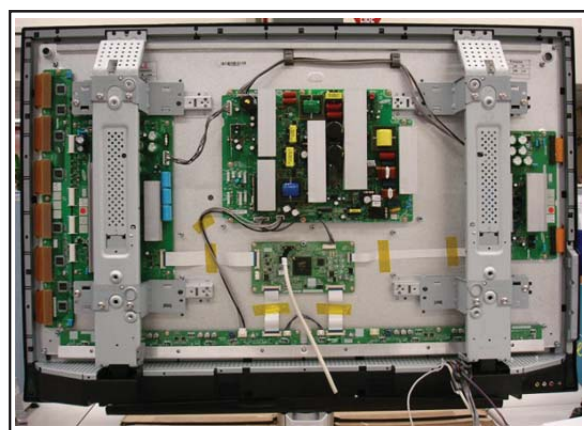
#### 4.3.9 PDP Panel

1. Refer to next figures.
2. Remove the bottom "speaker cover", as earlier described.
3. Unplug mains cable from PDP Power Supply Unit [1].
4. Unplug all connectors to/from the panels inside the "SSB tray". Pay attention to the LVDS connector.
5. Remove screws [2], and remove the metal "SSB tray" (incl. panels) from the set.
6. You now view the PDP boards, as shown in fig. "PDP panel [2/3]".
7. Remove fixation screws [3] and lift the complete PDP (incl. the boards and wiring) by means of the mounting brackets [4] from the set. Note: Remove these brackets [4] before returning the defective PDP.



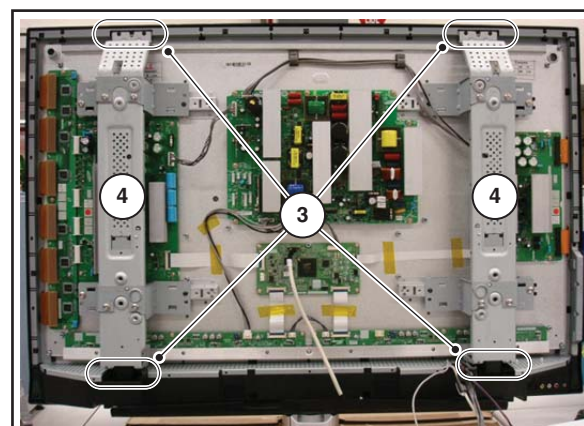
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Figure 4-12 PDP panel [1/3]



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Figure 4-13 PDP panel [2/3]

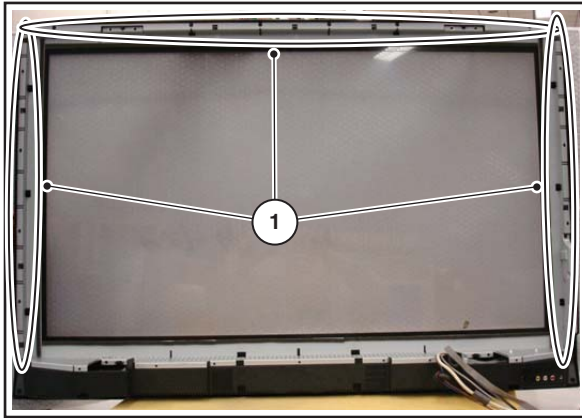


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Figure 4-14 PDP panel [3/3]

#### 4.3.10 Glass Plate

1. Refer to figures "Glass plate" below.
2. Remove T10 Parker screws [1] along the side of the glass plate, and remove the metal fixation brackets.
3. Lift the glass plate from the set.



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Figure 4-15 Glass plate

#### 4.4 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

**Notes:**

- While re-assembling, make sure that all cables are placed and connected in their original position. See figure "Cable dressing".
- Pay special attention not to damage the EMC foams. Ensure that EMC foams are mounted correctly.



## 5. Service Modes, Error Codes, and Fault Finding

### Index of this chapter:

- 5.1 Test Points
- 5.2 Service Modes
- 5.3 Service Tools
- 5.4 Error Codes
- 5.5 The Blinking LED Procedure
- 5.6 Software Upgrading
- 5.7 Fault Finding and Repair Tips

### 5.1 Test Points

In the chassis schematics and layout overviews, the test points (Fxxx) are mentioned. In the schematics, test points are indicated with a rectangular box around "Fxxx" or "Ixxx", in the layout overviews with a "half-moon" sign.

As most signals are digital, it will be difficult to measure waveforms with a standard oscilloscope. Several key ICs are capable of generating test patterns, which can be controlled via ComPair. In this way it is possible to determine which part is defective.

Perform measurements under the following conditions:

- Service Default Mode.
- Video: Colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

### 5.2 Service Modes

The Service Mode feature is split into four parts:

- Service Default Mode (SDM).
- Service Alignment Mode (SAM).
- Customer Service Mode (CSM) and Digital Customer Service Mode (DCSM).
- Computer Aided Repair Mode (ComPair).

SDM and SAM offer features, which can be used by the Service engineer to repair/align a TV set. Some features are:

- A pre-defined situation to ensure measurements can be made under uniform conditions (SDM).
- Activates the blinking LED procedure for error identification when no picture is available (SDM).
- The possibility to overrule software protections when SDM was entered via the Service pins.
- Make alignments (e.g. white tone), (de)select options, enter options codes, reset the error buffer (SAM).
- Display information ("SDM" or "SAM" indication in upper right corner of screen, error buffer, software version, operating hours, options and option codes, sub menus).

The (D)CSM is a Service Mode that can be enabled by the consumer. The CSM displays diagnosis information, which the customer can forward to the dealer or call centre. In CSM mode, "CSM", is displayed in the top right corner of the screen. The information provided in CSM and the purpose of CSM is to:

- Increase the home repair hit rate.
- Decrease the number of nuisance calls.
- Solved customers' problem without home visit.

ComPair Mode is used for communication between a computer and a TV on I2C /UART level and can be used by a Service engineer to quickly diagnose the TV set by reading out error codes, read and write in NVMs, communicate with ICs and the uP (PWM, registers, etc.), and by making use of a fault finding database. It will also be possible to up and download the software of the TV set via I2C with help of ComPair. To do this, ComPair has to be connected to the TV set via the ComPair connector, which will be accessible through the rear of the set (without removing the rear cover).

#### 5.2.1 General

Some items are applicable to all Service Modes or are general. These are listed below.

##### Life Timer

During the life time cycle of the TV set, a timer is kept. It counts the normal operation hours (not the Stand-by hours). The actual value of the timer is displayed in SDM and CSM in a decimal value. Every two soft-resets increase the hour by +1.

##### Software Identification, Version, and Cluster

The software ID, version, and cluster will be shown in the main menu display of SDM, SAM, and CSM.

The screen will show: "AAAABCD X.YY", where:

- **AAAA** is the chassis name: LC71 for analogue range (non-DVB), LC72 for digital range (DVB).
- **B** is the region indication: E= Europe, A= AP/China, U= NAFTA, L= LATAM.
- **C** is the display indication: L= LCD, P= Plasma.
- **D** is the language/feature indication: 1= standard, H= 1080p full HD.
- **X** is the main version number: this is updated with a major change of specification (incompatible with the previous software version). Numbering will go from 1 - 9 and A - Z.
  - If the main version number changes, the new version number is written in the NVM.
  - If the main version number changes, the default settings are loaded.
- **YY** is the sub version number: this is updated with a minor change (backwards compatible with the previous versions) Numbering will go from 00 - 99.
  - If the sub version number changes, the new version number is written in the NVM.
  - If the NVM is fresh, the software identification, version, and cluster will be written to NVM.

##### Display Option Code Selection

When after an SSB or display exchange, the display option code is not set properly, it will result in a TV with "no display". Therefore, **it is required** to set this display option code after such a repair.

To do so, press the following key sequence on a standard RC transmitter: "062598" directly followed by **MENU** and "xxx", where "xxx" is a 3 digit decimal value of the panel type: see column "Panel Code (Dec)" in table "Option codes OP1 ...OP7 (for all LC7.2E models)" in chapter 8 "Alignments", or see sticker on the side/bottom of the cabinet. When the value is accepted and stored in NVM, the set will switch to Stand-by, to indicate that the process has been completed.

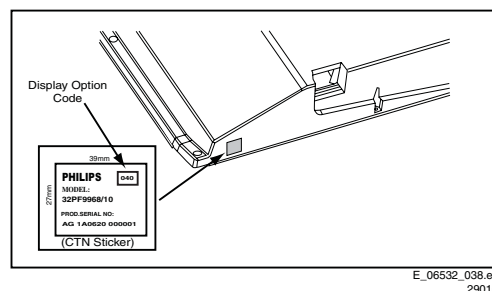


Figure 5-1 Location of Display Option Code sticker

During this algorithm, the NVM-content must be filtered, because several items in the NVM are TV-related and not SSB-related (e.g. Model and Prod. S/N). Therefore, "Model" and "Prod. S/N" data is changed into "See Type Plate".

In case a call centre or consumer reads “See Type Plate” in CSM mode, he needs to look to the side/bottom sticker to identify the set, for further actions.

### 5.2.2 Service Default Mode (SDM)

#### Purpose

Set the TV in SDM mode in order to be able to:

- Create a pre-defined setting for measurements to be made.
- Override software protections.
- Start the blinking LED procedure.
- Read the error buffer.
- Check the life timer.

#### Specifications

Table 5-1 SDM default settings

| Region                               | Freq. (MHz)       | Default syst. |
|--------------------------------------|-------------------|---------------|
| Europe (except France), AP-PAL-Multi | 475.25            | PAL B/G       |
| France                               |                   | SECAM L       |
| NAFTA, AP-NTSC                       | 61.25 (channel 3) | NTSC M        |
| LATAM                                |                   | PAL M         |

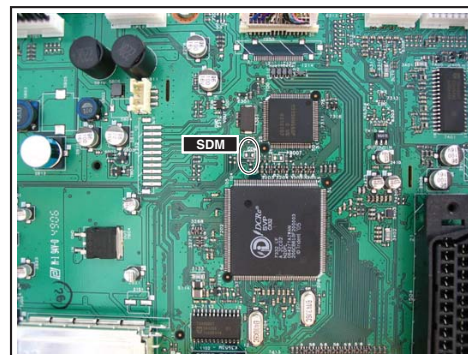
- Set linear video and audio settings to 50%, but volume to 25%. Stored user settings are not affected.
- All service-unfriendly modes (if present) are disabled, since they interfere with diagnosing/repairing a set. These service unfriendly modes are:
  - (Sleep) timer.
  - Blue mute/Wall paper.
  - Auto switch “off” (when there is no “ident” signal).
  - Hotel or hospital mode.
  - Child lock or parental lock (manual or via V-chip).
  - Skipping, blanking of “Not favourite”, “Skipped” or “Locked” presets/channels.
  - Automatic storing of Personal Preset or Last Status settings.
  - Automatic user menu time-out (menu switches back/OFF automatically).
  - Auto Volume levelling (AVL).

#### How to Activate

To activate SDM, use **one** of the following methods:

- Press the following key sequence on the remote control transmitter: “**062596**” directly followed by the **MENU** button (do not allow the display to time out between entries while keying the sequence).
- Short one of the “Service” jumpers on the TV board during cold start (see Figures “Service jumper”). Then press the mains button (remove the short after start-up).

**Caution:** Activating SDM by shorting “Service” jumpers will override the DC speaker protection (error 1), the General I2C error (error 4), and the Trident video processor error (error 5). When doing this, the service-technician must know exactly what he is doing, as it could damage the television set.

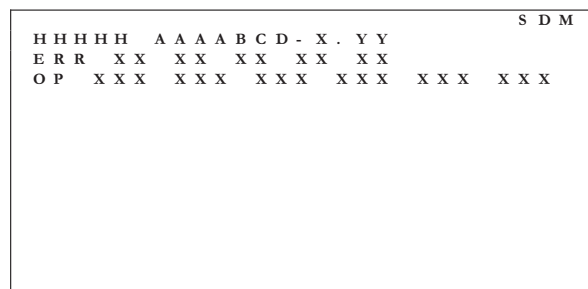


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Figure 5-2 Service jumper (SSB component side)

#### On Screen

After activating SDM, the following screen is visible, with SDM in the upper right corner of the screen to indicate that the television is in Service Default Mode.



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Figure 5-3 SDM menu

#### Menu explanation:

- **HHHHH**: Are the operating hours (in decimal).
- **AAAABCD-X.YY**: See paragraph “Service Modes” -> “General” -> “Software Identification, Version, and Cluster” for the SW name definition.
- **SDM**: The character “SDM” to indicate that the TV set is in Service mode.
- **ERR**: Shows all errors detected since the last time the buffer was erased. Five errors possible.
- **OP**: Used to read-out the option bytes. See “Options” in the Alignments section for a detailed description. Seven codes are possible.

#### How to Navigate

As this mode is read only, there is not much to navigate. To switch to other modes, use one of the following methods:

- Command MENU from the user remote will enter the normal user menu (brightness, contrast, colour, etc...) with “SDM” OSD remaining, and pressing MENU key again will return to the last status of SDM again.
- To prevent the OSD from interfering with measurements in SDM, command “OSD” (“STATUS” for NAFTA and LATAM) from the user remote will toggle the OSD “on/off” with “SDM” OSD remaining always “on”.
- Press the following key sequence on the remote control transmitter: “**062596**” directly followed by the **OSD/i+** button to switch to SAM (do not allow the display to time out between entries while keying the sequence).

#### How to Exit

Switch the set to STANDBY by pressing the mains button on the remote control transmitter or on the television set. If you switch the television set “off” by removing the mains (i.e., unplugging the television), the television set will remain in SDM when mains is re-applied, and the error buffer is not cleared.

The error buffer will only be cleared when the “clear” command is used in the SAM menu.

**Note:**

- If the TV is switched “off” by a power interrupt while in SDM, the TV will show up in the last status of SDM menu as soon as the power is supplied again. The error buffer will not be cleared.
- In case the set is in Factory mode by accident (with “F” displayed on screen), by pressing and hold “VOL-“ and “CH-“ together should leave Factory mode.

**5.2.3 Service Alignment Mode (SAM)**

**Purpose**

- To change option settings.
- To display / clear the error code buffer.
- To perform alignments.

**Specifications**

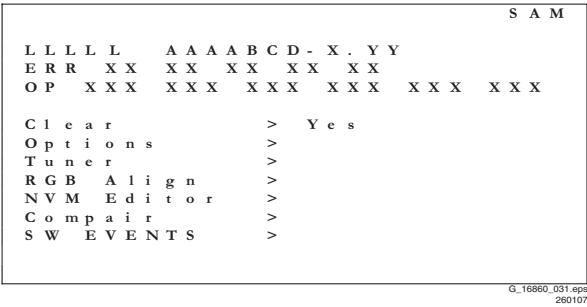
- Operation hours counter (maximum five digits displayed).
- Software version, error codes, and option settings display.
- Error buffer clearing.
- Option settings.
- Software alignments (Tuner, White Tone, and Audio).
- NVM Editor.
- ComPair Mode switching.
- Set the screen mode to full screen (all contents on screen are viewable).

**How to Activate**

To activate SAM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: “**062596**” directly followed by the **OSD/STATUS/INFO/i+** button (it depends on region which button is present on the RC). Do not allow the display to time out between entries while keying the sequence.
- Or via ComPair.

After entering SAM, the following screen is visible, with SAM in the upper right corner of the screen to indicate that the television is in Service Alignment Mode.



**Figure 5-4 SAM menu**

**Menu explanation:**

1. **LLLLL**. This represents the run timer. The run timer counts normal operation hours, but does not count Stand-by hours.
2. **AAAABCD-X.YY**. See paragraph “Service Modes” -> “General” -> “Software Identification, Version, and Cluster” for the SW name definition.
3. **SAM**. Indication of the Service Alignment Mode.
4. **ERR (ERRor buffer)**. Shows all errors detected since the last time the buffer was erased. Five errors possible.
5. **OP (Option Bytes)**. Used to read-out the option bytes. See “Options” in the Alignments section for a detailed description. Seven codes are possible.
6. **Clear**. Erases the contents of the error buffer. Select the CLEAR menu item and press the MENU RIGHT key. The content of the error buffer is cleared.
7. **Options**. Used to set the option bits. See “Options” in the “Alignments” chapter for a detailed description.
8. **Tuner**. Used to align the tuner. See “Tuner” in the “Alignments” chapter for a detailed description.
9. **RGB Align**. Used to align the White Tone. See “White Tone” in the “Alignments” chapter for a detailed description.
10. **NVM Editor**. Can be used to change the NVM data in the television set. See also paragraph “Fault Finding and Repair Tips” further on.
11. **ComPair**. Can be used to switch the television to “In Application Programming” mode (IAP), for software

uploading via ComPair. Read paragraph "Service Tools" - > "ComPair". **Caution:** When this mode is selected without ComPair connected, the TV will be blocked. Remove the AC power to reset the TV.

12. **SW Events.** Only to be used by development to monitor SW behaviour during stress test.

#### How to Navigate

- In the SAM menu, select menu items with the MENU UP/DOWN keys on the remote control transmitter. The selected item will be indicated. When not all menu items fit on the screen, use the MENU UP/DOWN keys to display the next / previous menu items.
- With the MENU LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected sub menu.
- When you press the MENU button twice while in top level SAM, the set will switch to the normal user menu (with the SAM mode still active in the background). To return to the SAM menu press the MENU button.
- Command "OSD/i+" key from the user remote will toggle the OSD "on/off" with "SAM" OSD remaining always "on".
- Press the following key sequence on the remote control transmitter: "062596" directly followed by the MENU button to switch to SDM (do not allow the display to time out between entries while keying the sequence).

#### How to Store SAM Settings

To store the settings changed in SAM mode (except the OPTIONS settings), leave the top level SAM menu by using the POWER button on the remote control transmitter or the television set.

#### How to Exit

Switch the set to STANDBY by pressing the mains button on the remote control transmitter or the television set.

#### Note:

- When the TV is switched "off" by a power interrupt while in SAM, the TV will show up in "normal operation mode" as soon as the power is supplied again. The error buffer will not be cleared.
- In case the set is in Factory mode by accident (with "F" displayed on screen), by pressing and hold "VOL-" and "CH-" together should leave Factory mode.

### 5.2.4 Customer Service Mode (CSM)

#### Purpose

The Customer Service Mode shows error codes and information on the TV's operation settings. A call centre can instruct the customer (by telephone) to enter CSM in order to identify the status of the set. This helps them to diagnose problems and failures in the TV before making a service call. The CSM is a read-only mode; therefore, modifications are not possible in this mode.

#### Specifications

- Ignore "Service unfriendly modes".
- Line number for every line (to make CSM language independent).
- Set the screen mode to full screen (all contents on screen are viewable).
- After leaving the Customer Service Mode, the original settings are restored.
- Possibility to use "CH+" or "CH-" for channel surfing, or enter the specific channel number on the RC.

#### How to Activate

To activate CSM, press the following key sequence on the remote control transmitter: "123654" (do not allow the display to time out between entries while keying the sequence).

Upon entering the Customer Service Mode, the following screen will appear:

|    |                                  | CSM |
|----|----------------------------------|-----|
| 1  | MODEL : 32PFL5522D/10            |     |
| 2  | PROD S / N: AG1A0712123456       |     |
| 3  | SW ID : LC71EL1-1. xx            |     |
| 4  | OP : XXX XXX XXX XXX XXX XXX XXX |     |
| 5  | CODES : XX XX XX XX XX           |     |
| 6  | SSB : 3139 127 12341             |     |
| 7  | NVM : XXXXXXXX                   |     |
| 8  | Flash Data: XX.XX.XX.XX          |     |
| 9  | LIFE TIMER: LLLLL                |     |
| 10 | TUNER : WEAK / GOOD / STRONG     |     |
| 11 | SYSTEM: PAL / NTSC / SECAM       |     |
| 12 | SOUND : MONO / STEREO / NICAM    |     |
| 13 | HDAU : YES / NO                  |     |
| 14 | FORMAT: XXXXXXXX                 |     |

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Figure 5-5 CSM menu (example)

#### Menu Explanation:

- MODEL.** Type number, e.g. 42PFL7662/12. (\*)
- PROD S/N.** Product serial no., e.g. SV1A0701000008. (\*)
- SW ID.** Software cluster and version is displayed.
- OP.** Option code information.
- CODES.** Error buffer contents.
- SSB.** Indication of the SSB factory ID (= 12nc). (\*)
- NVM.** The NVM software version no.
- Flash Data.** PQ (picture quality) and AQ (audio quality) data version. This is a sub set of the main SW.
- LIFE TIMER.** Operating hours indication.
- TUNER.** Indicates the tuner signal condition: "Weak" when signal falls below threshold value, "Medium" when signal is at mid-range, and "Strong" when signal falls above threshold value.
- SYSTEM.** Gives information about the video system of the selected transmitter (PAL/SECAM/NTSC).
- SOUND.** Gives information about the audio system of the selected transmitter (MONO/STEREO/NICAM).
- HDAU.** HDMI audio stream detection. "YES" means audio stream detected. "NO" means no audio stream present. Only displayed when HDMI source is selected.
- FORMAT.** Gives information about the video format of the selected transmitter (480i/480p/720p/1080i).
- HD SW ID.** Software version of the 1080p full HD module (when present).
- Reserved.**
- Reserved.**
- Reserved.**

(\*) If an NVM IC is replaced or initialised, the Model Number, Serial Number, and SSB Code Number must be re-written to the NVM. ComPair will foresee in a possibility to do this.

#### How to Exit

To exit CSM, use one of the following methods:

- Press the MENU button twice, or POWER button on the remote control transmitter.
- Press the POWER button on the television set.



5.2.5 Digital Customer Service Mode (DCSM)

Purpose

The Digital Customer Service Mode shows error codes and information on the IBO Zapper module (DVB reception part) operation settings. The call centre can instruct the customer to activate DCSM by telephone and read off the information displayed. This helps the call centre to diagnose problems and failures in the IBO Zapper module before making a service call. The DCSM is a read-only mode; therefore, modifications are not possible in this mode.

How to Activate

To activate the DCSM, put the television in its digital mode (via the "A/D" button on the remote control).

1. Press the "Digital Menu" button on the remote control to activate the digital user menu (called "Setup").
2. Activate the "Information" sub menu (via the "down" and "right" cursor buttons).
3. In the "Information" sub menu, press the following key sequence on the remote control to activate the DCSM: "GREEN RED YELLOW 9 7 5 9" (do not allow the display to time out between entries while keying this sequence). Then, the "Service menu" will appear (see figures below).

Alternative method to activate DCSM: press key sequence "123654" on the remote control transmitter while in digital mode (do not allow the display to time out between entries while keying the sequence). Then, the "Service menu" will appear (see figures below).

Menu explanation

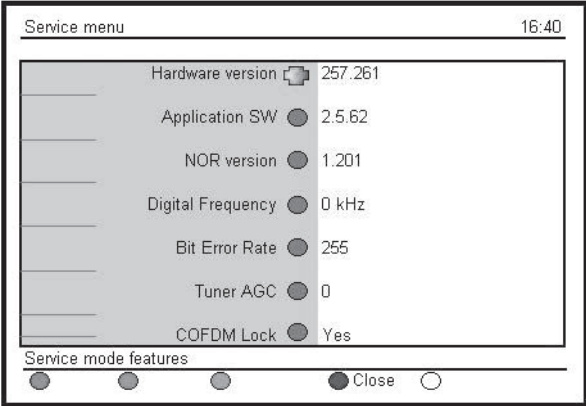


Figure 5-6 DCSM menu - 1

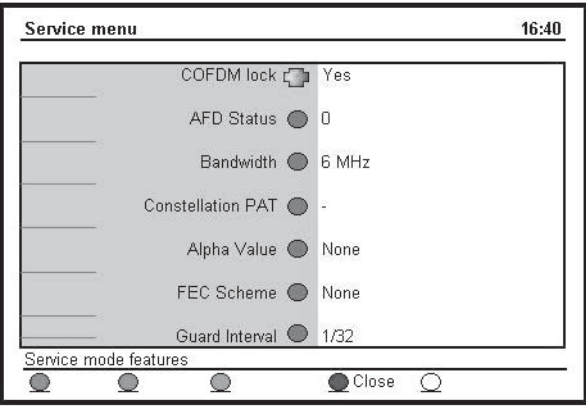


Figure 5-7 DCSM menu - 2

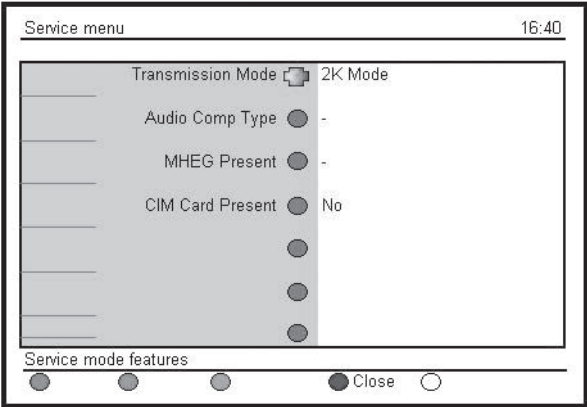


Figure 5-8 DCSM menu - 3

Menu Explanation:

1. **Hardware version:** This indicates the version of the IBO Zapper module hardware.
2. **Application SW:** The application software version.
3. **NOR Version:** The NOR Flash image software version
4. **Digital Frequency:** The digital frequency that the set is tuned to.
5. **Bit Error Rate:** The error rate measured before the error correction algorithm circuitry. (this value gives an impression of the received signal)
6. **Tuner AGC:** Tuner AGC value.
7. **COFDM Lock:** Indication if COFDM decoder is locked.
8. **AFD Status:** Status of the Active Picture Format Descriptor.
9. **Terrestrial Delivery System Parameters:**

– **Bandwidth:** Bandwidth of the received signal.

– **Constellation Pattern:** Displays the signal constellation.

– **Alpha Value:** Displays the Alpha Value.

– **FEC Scheme:** Displays the Forward Error Correcting Scheme

– **Guard Interval:** Displays the value for the Guard Interval.

– **Transmission Mode:** Displays the Transmission Mode.
10. **Audio Comp Type:** Type of detected audio stream.
11. **MHEG Present:** Indicates if MHEG is present or not.
12. **CIM Card Present:** Indicates if CIM card is present or not.

How to exit

Press the **BLUE** button on the Remote Control to exit DCSM.

## 5.3 Service Tools

### 5.3.1 ComPair

#### Introduction

ComPair (Computer Aided Repair) is a Service tool for Philips Consumer Electronics products. and offers the following:

1. ComPair helps you to quickly get an understanding on how to repair the chassis in a short and effective way.
2. ComPair allows very detailed diagnostics and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C or UART commands yourself, because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the uP is working) and all repair information is directly available.
4. ComPair features TV software upgrade possibilities.

#### Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The (new) ComPair II interface box is connected to the PC via an USB cable. For the TV chassis, the ComPair interface box and the TV communicate via a bi-directional cable via the service connector(s).

The ComPair fault finding program is able to determine the problem of the defective television, by a combination of automatic diagnostics and an interactive question/answer procedure.

#### How to Connect

This is described in the chassis fault finding database in ComPair.

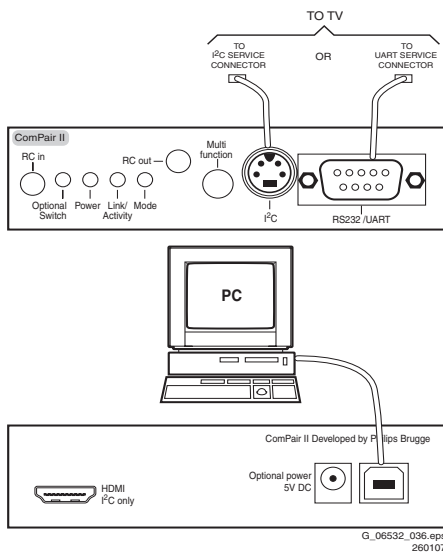


Figure 5-9 ComPair II interface connection

**Caution:** It is compulsory to connect the TV to the PC as shown in the picture above (with the ComPair interface in between), as the ComPair interface acts as a level shifter. If one connects the TV directly to the PC (via UART), ICs will be blown!

#### How to Order

ComPair II order codes:

- ComPair II interface: 3122 785 91020.
- ComPair32 CD (update): 3122 785 60160.
- ComPair interface cable: 3122 785 90004.
- ComPair interface extension cable: 3139 131 03791.
- ComPair UART interface cable: 3122 785 90630.

**Note:** If you encounter any problems, contact your local support desk

### 5.3.2 LVDS Tool

#### Introduction

This Service tool (also called "ComPair Assistant 1") may help you to identify, in case the TV does not show any picture, whether the Small Signal Board (SSB) or the display of a Flat TV is defective. Thus to determine if LVDS, RGB, and sync signals are okay.

When operating, the tool will show a small (scaled) picture on a VGA monitor. Due to a limited memory capacity, it is not possible to increase the size when processing high-resolution LVDS signals (> 1280x960). Below this resolution, or when a DVI monitor is used, the displayed picture will be full size.

#### How to Connect

Connections are explained in the user manual, which is packed with the tool. The LVDS cables included in the package cover most chassis. For some chassis, a separate cable must be ordered.

**Note:** To use the LVDS tool, you must have ComPair release 2004-1 (or later) on your PC (engine version >= 2.2.05). For every TV type number and screen size, one must choose the proper settings via ComPair. The ComPair file will be updated regularly with new introduced chassis information.

#### How to Order

- LVDS tool (incl. two LVDS cables: 31p and 20p, covering chassis BJx, EJx, FJx and LC4.1): 3122 785 90671.
- LVDS tool Service Manual: 3122 785 00810.
- LVDS cable 20p/DF -> 20p/DF (standard with tool): 3122 785 90731.
- LVDS cable 31p/FI -> 31p/FI (standard with tool): 3122 785 90662.

For other chassis, a separate LVDS cable must be ordered. Refer to table "LVDS cable order number" for an overview of all available cables.

Table 5-2 LVDS cable order number

| Chassis | LVDS cable order number                         | Remarks                 |
|---------|-------------------------------------------------|-------------------------|
| BJ2.4   | 3122 785 90662 <sup>1</sup>                     |                         |
| BJ2.5   | 3122 785 90662 <sup>1</sup>                     |                         |
| BJ3.0   | 3122 785 90662 <sup>1</sup>                     |                         |
| BJ3.1   | 3122 785 90662 <sup>1</sup>                     |                         |
| EJ2.0   | 3122 785 90662 <sup>1</sup>                     |                         |
| EJ3.0   | 3122 785 90662 <sup>1</sup>                     |                         |
| EL1.1   | 3122 785 90662 <sup>1</sup> / 3122 785 90821    |                         |
| FJ3.0   | 3122 785 90662 <sup>1</sup>                     |                         |
| FTL2.4  | 3122 785 90662 <sup>1, 2</sup>                  |                         |
| LC4.1   | 3122 785 90731 <sup>1</sup> / 3122 785 90851    |                         |
| LC4.3   | 3122 785 90821                                  |                         |
| LC4.31  | 3122 785 90821                                  |                         |
| LC4.41  | 3122 785 90662 <sup>1, 2</sup> / 3122 785 90851 | Only for 26 & 32" sets. |
| LC4.8   | 3122 785 90662 <sup>1, 2</sup> / 3122 785 90851 |                         |
| LC4.9   | 3122 785 90662 <sup>1, 2</sup> / 3122 785 90851 | MFD variant only.       |
| LC7.x   | t.b.d.                                          |                         |
| JL2.1   | 3122 785 90861                                  |                         |

#### Notes:

1. Included in LVDS tool package.
2. Pins "27" and "28" must be grounded or not connected.

## 5.4 Error Codes

### 5.4.1 Introduction

Error codes are required to indicate failures in the TV set. In principle a unique error code is available for every:

- Activated protection.
- Failing I2C device.
- General I2C error.
- SDRAM failure.

The last five errors, stored in the NVM, are shown in the Service menu's. This is called the error buffer.

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.

An error will be added to the buffer if this error differs from any error in the buffer. The last found error is displayed on the left.

An error with a designated error code may **never** lead to a deadlock situation. This means that it must always be diagnosable (e.g. error buffer via OSD or blinking LED procedure, ComPair to read from the NVM).

In case a failure identified by an error code automatically results in other error codes (cause and effect), only the error code of the MAIN failure is displayed.

**Example:** In case of a failure of the I2C bus (CAUSE), the error code for a "General I2C failure" and "Protection errors" is displayed. The error codes for the single devices (EFFECT) is not displayed. All error codes are stored in the same error buffer (TV's NVM) except when the NVM itself is defective.

### 5.4.2 How to Read the Error Buffer

You can read the error buffer in 3 ways:

- On screen via the SAM/SDM/CSM (if you have a picture).  
Example:
  - ERROR: 0 0 0 0 0 : No errors detected
  - ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
  - ERROR: 9 6 0 0 0 : Error code 6 was detected first and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See "The Blinking LED Procedure".
- Via ComPair.

### 5.4.3 Error Codes

In case of non-intermittent faults, write down the errors present in the error buffer and clear the error buffer before you begin the repair. This ensures that old error codes are no longer present.

If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error and not the actual cause of the problem (for example, a fault in the protection detection circuitry can also lead to a protection).

Table 5-3 Error code overview

| Error code <sup>1)</sup> | Description                                              | Item nr.         | Remarks                                                                                                                                                                                |
|--------------------------|----------------------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0                        | No error.                                                |                  |                                                                                                                                                                                        |
| 1                        | DC Protection of speakers.                               |                  |                                                                                                                                                                                        |
| 2                        | +12V protection error.                                   |                  | 12V missing or "low".                                                                                                                                                                  |
| 3                        | Reserved.                                                |                  |                                                                                                                                                                                        |
| 4                        | General I2C error.                                       |                  | note 2                                                                                                                                                                                 |
| 5                        | Trident Video Processor communication error.             | 7202             | When Trident IC is defective, error 10 and 14 might also be reported. Trident communicates via parallel bus, not via the I2C bus. The I2C bus of Trident is only used in ComPair mode. |
| 6                        | I2C error while communicating with the NVM.              | 7315             | The TV will not start-up due to critical data not available from the NVM, but the LED will blink the error code.                                                                       |
| 7                        | I2C error while communicating with the Tuner.            | 1101             |                                                                                                                                                                                        |
| 8                        | I2C error while communicating with the IF Demodulator.   | 7113             |                                                                                                                                                                                        |
| 9                        | I2C error communicating with the Sound Processor.        | 7411             |                                                                                                                                                                                        |
| 10                       | SDRAM defective.                                         | 7204             |                                                                                                                                                                                        |
| 11                       | I2C error while communicating with the HDMI IC.          | 7817             |                                                                                                                                                                                        |
| 12                       | I2C error while communicating with the MOJO PNX8314.     | 7G00             | if applicable                                                                                                                                                                          |
| 13                       | DVB HW communication error.                              | 7F01, 7K00, 7G00 | if applicable                                                                                                                                                                          |
| 14                       | SDRAM defective.                                         | 7205             |                                                                                                                                                                                        |
| 15                       | Reserved.                                                |                  |                                                                                                                                                                                        |
| 16                       | Reserved.                                                |                  |                                                                                                                                                                                        |
| 17                       | Reserved.                                                |                  |                                                                                                                                                                                        |
| 18                       | I2C error while communicating with the iBoard processor. |                  | if applicable                                                                                                                                                                          |
| 19                       | I2C error while communication with 1080p bolt-on module. |                  | if applicable                                                                                                                                                                          |

#### Notes

1. Some of the error codes reported are depending on the option code configurations.
2. This error means: no I2C device is responding to the particular I2C bus. Possible causes: SCL/SDA shorted to GND, SCL shorted to SDA, or SCL/SDA open (at uP pin). The internal bus of the Trident platform should not cause the entire system to halt as such an error can be reported.

### 5.4.4 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:

- By using the CLEAR command in the SAM menu:
  - To enter SAM, press the following key sequence on the remote control transmitter: "062596" directly followed by the OSD/i+ button (do not allow the display to time out between entries while keying the sequence).
  - Make sure the menu item CLEAR is selected. Use the MENU UP/DOWN buttons, if necessary.
  - Press the MENU RIGHT button to clear the error buffer. The text on the right side of the "CLEAR" line will change from "CLEAR?" to "CLEARED"
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

**Note:** If you exit SAM by disconnecting the mains from the television set, the error buffer is not reset.

## 5.5 The Blinking LED Procedure

### 5.5.1 Introduction

The software is capable of identifying different kinds of errors. Because it is possible that more than one error can occur over time, an error buffer is available, which is capable of storing the last five errors that occurred. This is useful if the OSD is not working properly.

Errors can also be displayed by the blinking LED procedure. The method is to repeatedly let the front LED pulse with as many pulses as the error code number, followed by a period of 1.5 seconds in which the LED is "off". Then this sequence is repeated.

**Example (1):** error code 4 will result in four times the sequence LED "on" for 0.25 seconds / LED "off" for 0.25 seconds. After this sequence, the LED will be "off" for 1.5 seconds. Any RC5 command terminates the sequence. Error code LED blinking is in red colour.

**Example (2):** the content of the error buffer is "12 9 6 0 0". After entering SDM, the following occurs:

- 1 long blink of 5 seconds to start the sequence,
- 12 short blinks followed by a pause of 1.5 seconds,
- 9 short blinks followed by a pause of 1.5 seconds,
- 6 short blinks followed by a pause of 1.5 seconds,
- 1 long blink of 1.5 seconds to finish the sequence,
- The sequence starts again with 12 short blinks.

### 5.5.2 Displaying the Entire Error Buffer

Additionally, the entire error buffer is displayed when Service Mode "SDM" is entered. In case the TV set is in protection or Stand-by: The blinking LED procedure sequence (as in SDM-mode in normal operation) must be triggered by the following RC sequence: "MUTE" "062500" "OK".

In order to avoid confusion with RC5 signal reception blinking, this blinking procedure is terminated when a RC5 command is received.

To erase the error buffer, the RC command "MUTE" "062599" "OK" can be used.

## 5.6 Software Upgrading

In this chassis, two SW "stacks" are used:

- TV mains SW (processor and processor NVM).
- Digital TV SW (IBO Zapper).

### 5.6.1 TV Main SW Upgrade

For instructions on how to upgrade the TV Main software, refer to ComPair.

### 5.6.2 "Digital TV" Software Upgrade

How to Upgrade Philips "Digital TV" Software (IBO Zapper):

#### **Preparation of the Memory Device for Software Upgrade**

For the procedure you will require:

1. A personal computer with web browsing capability.
2. An archive utility that supports the ZIP-format (e.g. Winzip for Windows).
3. A CompactFlash PC Card Adapter (Type II).
4. A CompactFlash (Type I) portable memory card for insertion into the PC Card Adapter. Philips recommends using Compact Flash (CF) portable memory cards with their respective PC Card Adapters (Sandisk or Kingston) with memory sizes of up to 256MB. Philips does not guarantee that other types of portable memory cards and their respective PC Card Adapters, including multi-card PC Card Adapters work on Philips Digital TV.

**Note:** Only FAT16-formatted portable memory is supported. NTFS & FAT32 are not supported.

#### **Copying of Software Image Files to the Flash Device**

Copy the appropriate "FCL.img" and "IBOZ.img" to the root directory of the flash device.

#### **Verifying the Current Version of the TV Software**

Before you start the software upgrade procedure, it is advised to check what the current TV software is. The current TV software version can be seen in the "System software" menu.

1. First press the "A/D" key and then the "DIGITAL MENU" key on the remote controller to access the "Setup" menu.
2. Access the "Information" menu.
3. Access the "Current software version" menu.

#### **Example:**

The menu shows "IdtvZapper\_HW260.256\_SW2.0.24". This means that the hardware version is "260.256" and the software version is "2.0.24".

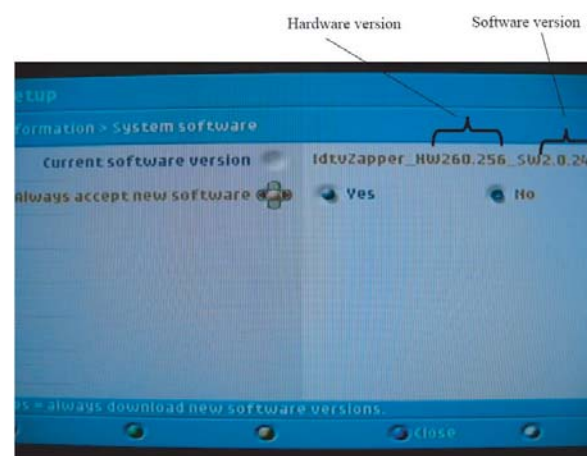


Figure 5-10 Current software version



### Software Upgrade Procedure

1. Power ON your TV with the power switch at the side of the TV. Put your TV ON by using the remote controller if the TV is in Stand-by.
2. Make sure that it is in "Digital" mode (via "A/D" button).
3. Make sure that your TV is not in Stand-by. Power OFF your TV **with the power switch of the TV**.
4. Remove the Conditional Access Module (if any) from the CI-slot.
5. Insert the PC Card Adapter with the portable memory card containing the software upgrade files.
6. Switch ON your TV with the power switch at the side of the TV.
7. At start-up, the TV will scan the CI slot until it finds the update content. The TV will automatically go to the upgrade mode. After a few seconds it will display the status of the upgrade procedure.

#### Warnings:

Do NOT remove the memory card or the PC card adapter during the software upgrade procedure.

In case of a power drop during the upgrade procedure, don't remove the portable memory from the TV. The TV will continue the upgrade as soon as the power comes back.

**Example:** At start-up of the TV, the current software is erased.

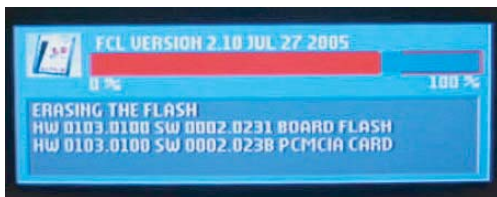


Figure 5-11 Erasure of the software

If the erasure is successful, the programming will start.

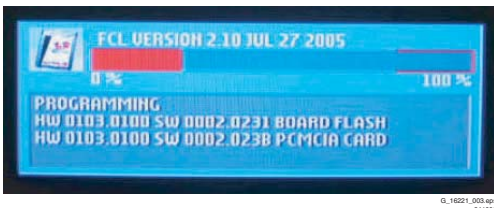


Figure 5-12 Programming of the software

**Example:** The programming is completed when the progress bar reaches the 100% mark.



Figure 5-13 Programming complete

The TV will reset and the screen will go blank, after a few seconds a dialogue box will occur to inform you that the current module inserted in the CI slot is not recognized. This is normal as the slot only recognizes a Conditional Access Module during normal operation.

**Example:** The following dialogue box will appear after the TV is upgraded successfully:

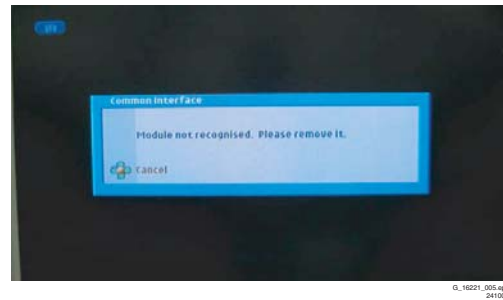


Figure 5-14 Upgrade ready

When the software upgrade has been successful, switch OFF the TV, remove the PC Card Adapter, and restart the TV with the Power switch at the side of the TV.

The TV will now start up with the new software.

### Verifying that the Software Has Been Upgraded Successfully

Verify that the software is upgraded to the new version by following the procedure outlined in the section "Verifying the current version of the TV software".

## 5.7 Fault Finding and Repair Tips

### Notes:

- It is assumed that the components are mounted correctly with correct values and no bad solder joints.
- Before any fault finding actions, check if the correct options are set.

### 5.7.1 NVM Editor

In some cases, it can be convenient if one directly can change the NVM contents. This can be done with the "NVM Editor" in SAM mode. With this option, single bytes can be changed.

### Caution:

- **Do not change the NVM settings without understanding the function of each setting, because incorrect NVM settings may seriously hamper the correct functioning of the TV set!**
- Always write down the existing NVM settings, before changing the settings. This will enable you to return to the original settings, if the new settings turn out to be incorrect.

**Table 5-4 NVM editor overview**

|        | Hex    | Dec | Description    |
|--------|--------|-----|----------------|
| .ADR   | 0x000A | 10  | Existing value |
| .VAL   | 0x0000 | 0   | New value      |
| .Store | Store? |     |                |

### 5.7.2 Load Default NVM Values

It is possible to download default values automatically into the NVM in case a blank NVM is placed or when the NVM first 20 address contents are "FF". After the default values are downloaded, it is possible to start-up and to start aligning the TV set. To initiate a forced default download the following action has to be performed:

1. Switch "off" the TV set with the mains cord disconnected from the wall outlet (it does not matter if this is from "Stand-by" or "Off" situation).
2. Short-circuit the SDM jumpers on the SSB (keep short circuited).
3. Press "P+" or "CH+" on the local keyboard (and keep it pressed).
4. Reconnect the mains supply to the wall outlet.
5. Release the "P+" or "CH+" when the set is "on" or blue LED is blinking.

When the downloading has completed successfully, the set should be into Stand-by, i.e. red LED on.

### Alternative method (1):

1. Go to SAM.
2. Select NVM Editor.
3. Select ADR (address) to 1 (dec).
4. Change the VAL (value) to 170 (dec).
5. Store the value.
6. Do a hard reset to make sure new default values took place.

### Alternative method (2):

It is also possible to upload the default values to the NVM with ComPair in case the SW is changed, the NVM is replaced with a new (empty) one, or when the NVM content is corrupted. After replacing an EEPROM (or with a defective/no EEPROM), default settings should be used to enable the set to start-up and allow the Service Default Mode and Service Alignment Mode to be accessed.

### 5.7.3 Start-up/Shut-down Flowcharts

Important note for DVB sets:

- When you put a DVB set into Stand-by mode **with an RC**, the set will go to "Semi Stand-by" mode for 5 minutes. This, to facilitate "Off the Air download" (OAD). If there is no activity within these 5 minutes, the set will switch to Stand-by mode. In "Semi Stand-by" mode, the LCD backlight and Audio Amplifier are turned "off" but other circuits still work as normal. The customer might think the set is in Stand-by. However, in real Stand-by mode, only the uP and the NVM are alive and all other circuits are switched "off".
- If you press **the mains switch** at the local key board in a DVB set, the set will switch to Stand-by mode.

On the next pages you will find start-up and shut-down flowcharts, which might be helpful during fault finding.

**Please note** that some events are only related to LCD sets, and therefore not applicable to this PDP chassis.

Start Up

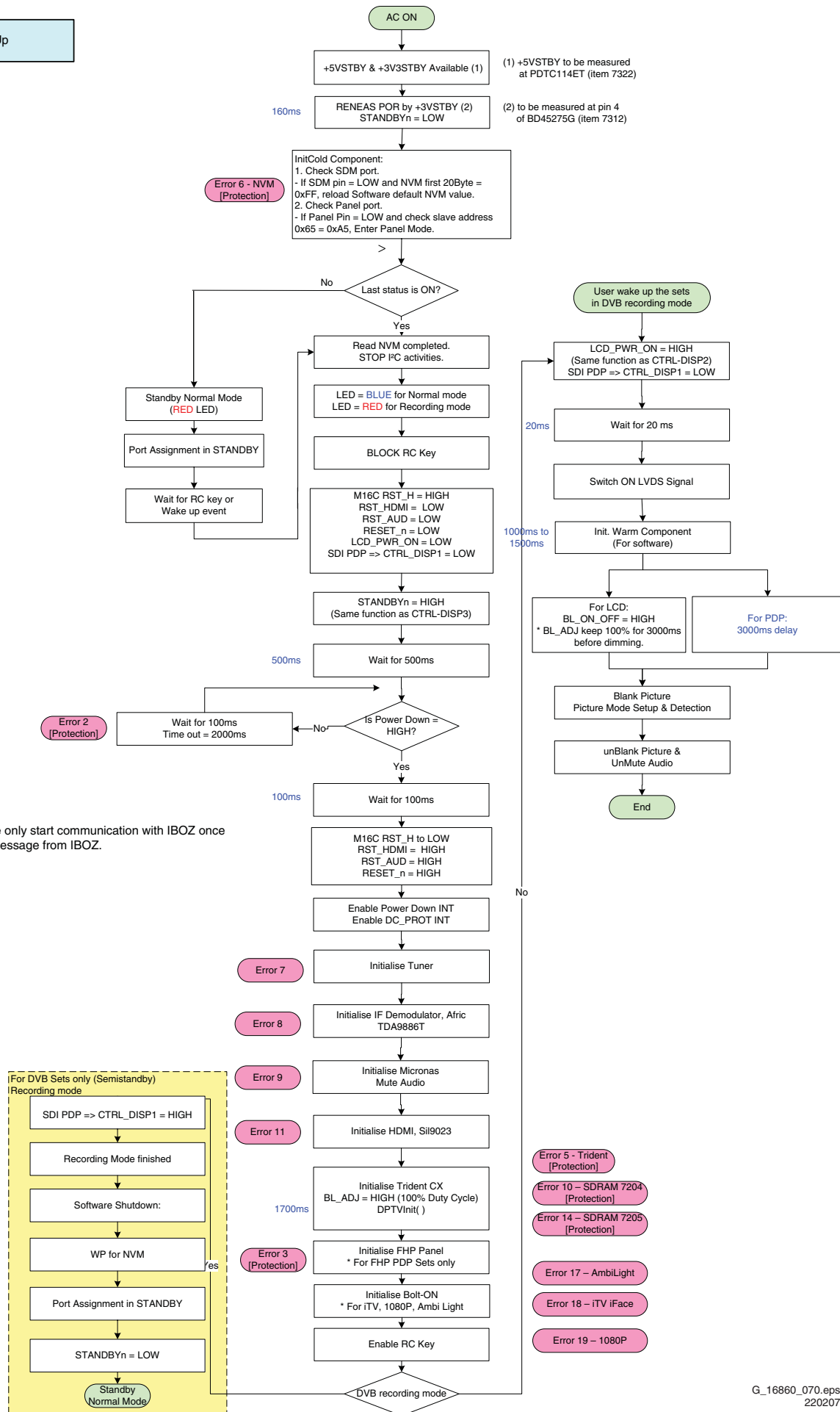


Figure 5-15 Start-up flowchart

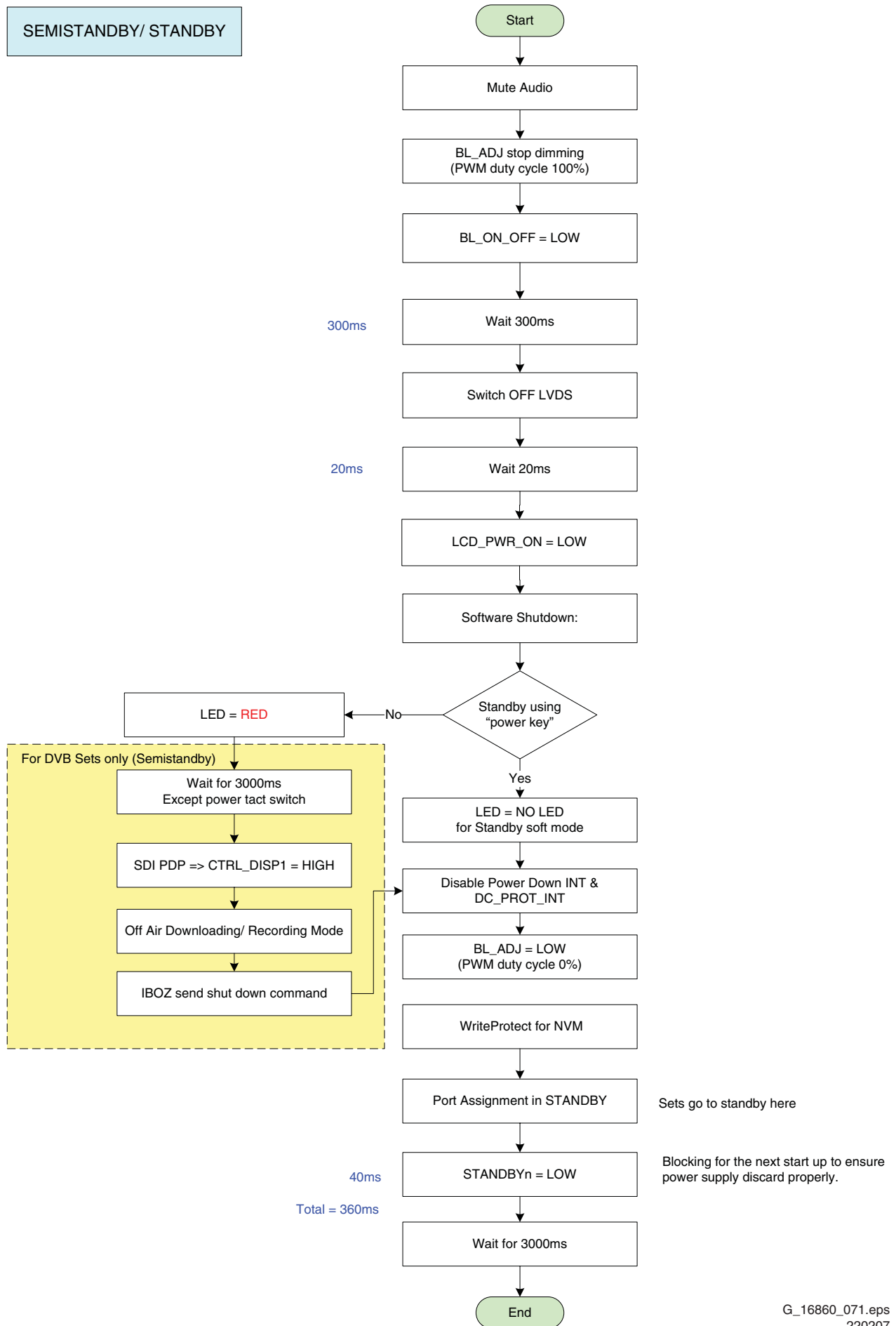
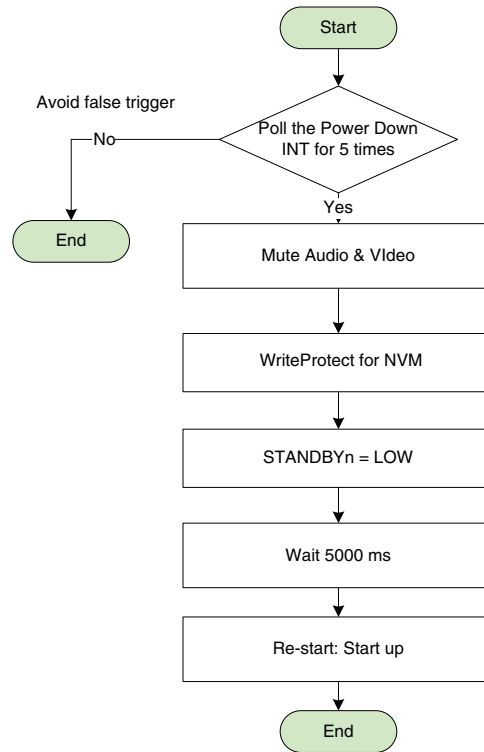


Figure 5-16 Semi Stand-by/Stand-by flowchart

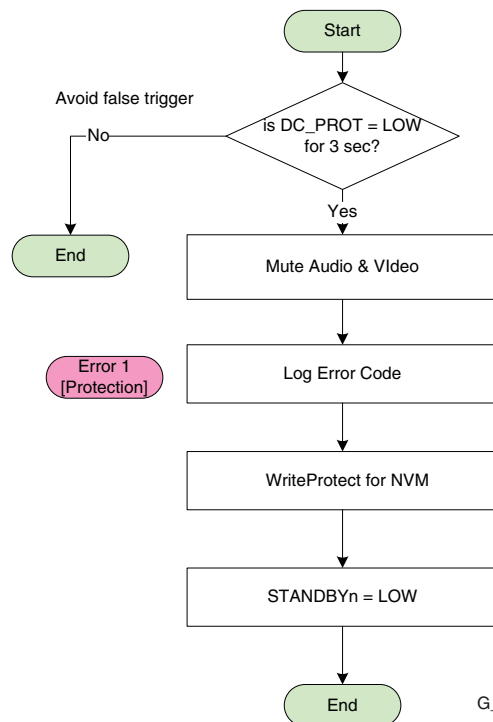
Power Down INT:  
AC OFF or Transient INT

Notes:

1. Power Down INT will be based on fall edge triggering
2. +3V3STBY will stay for 15ms, software must perform WriteProtect for NVM within 15ms.



DC\_PROT INT



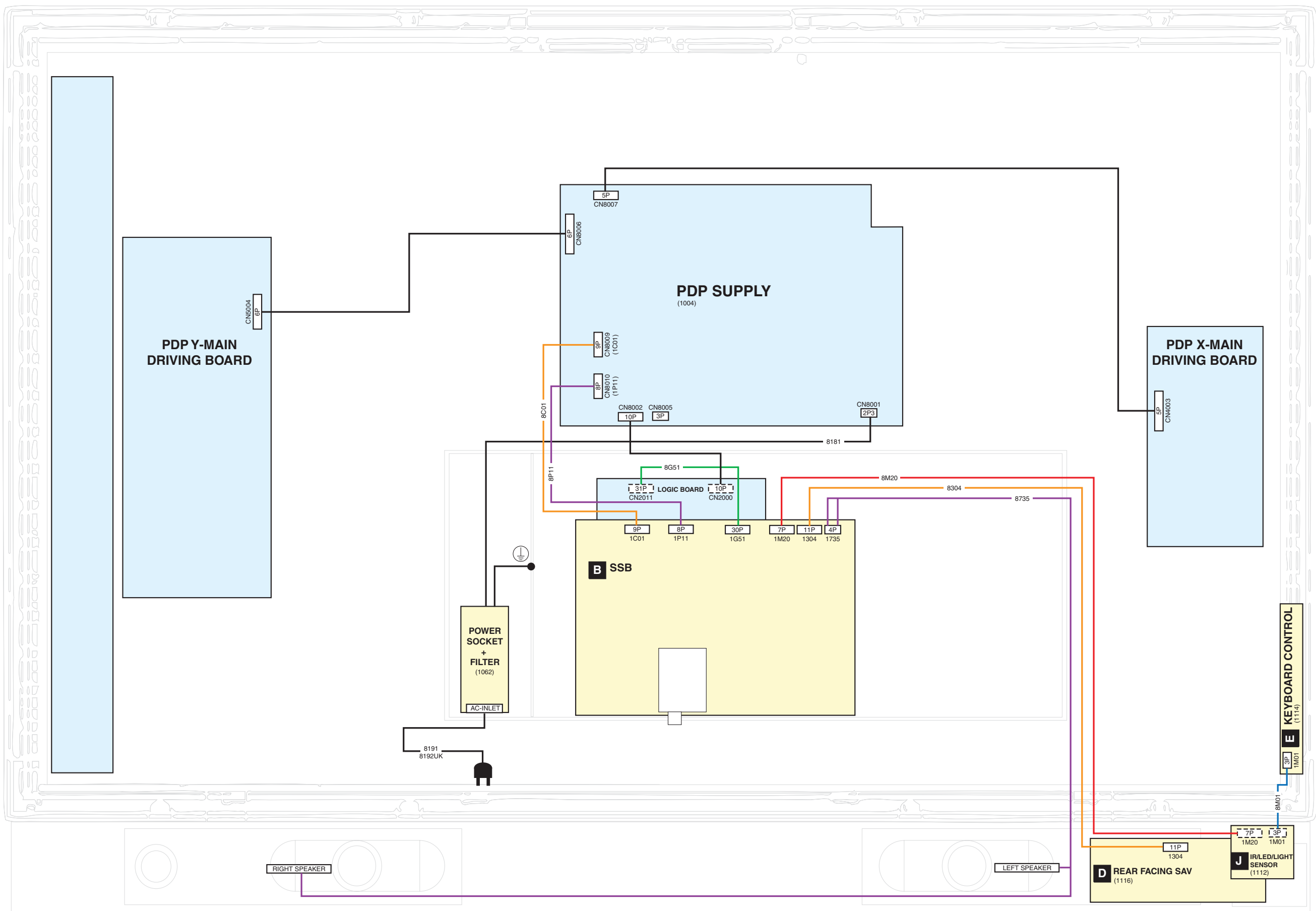
G\_16860\_072.eps  
220207

Figure 5-17 Power Down & DC\_PROT flowchart

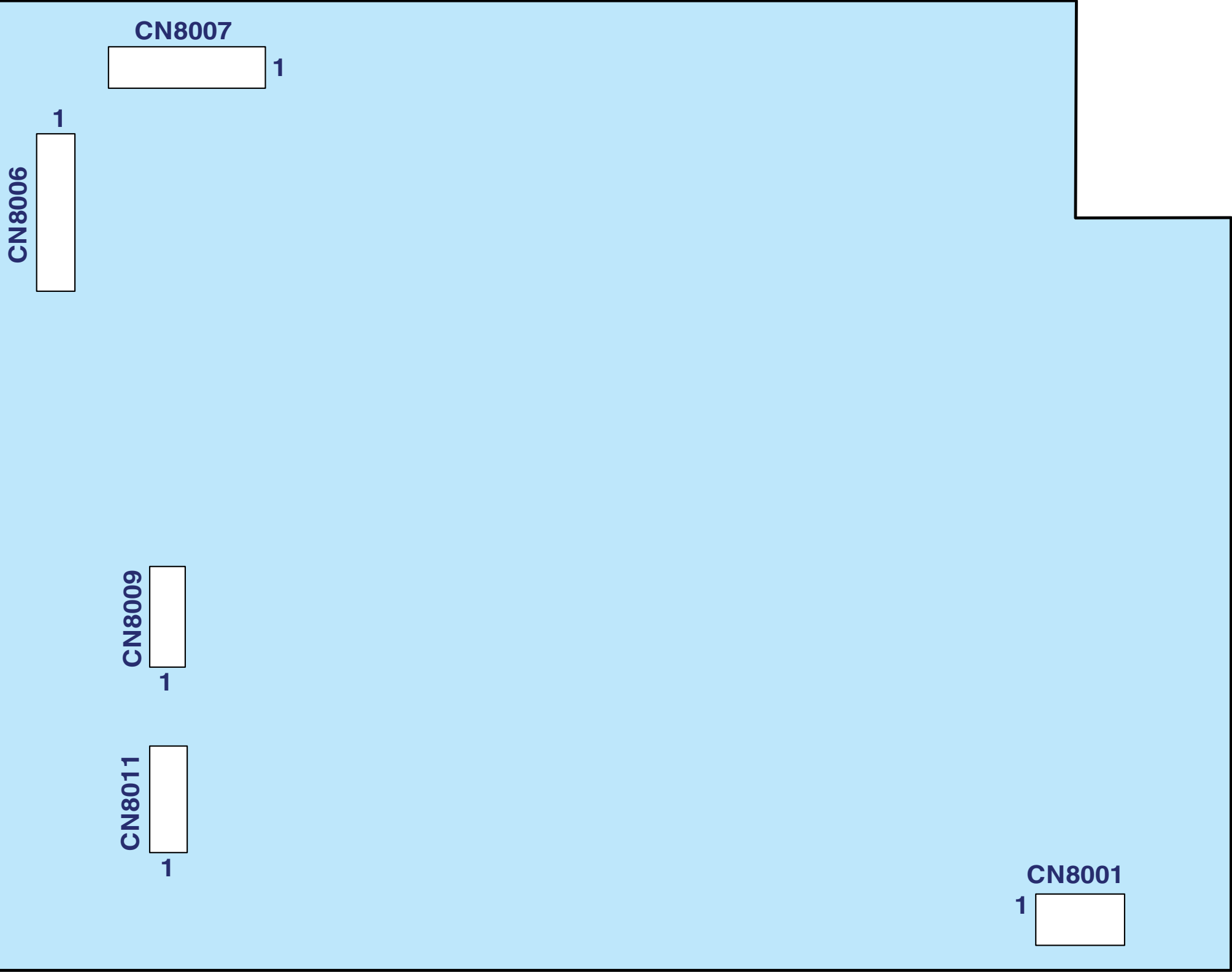


6. Block Diagrams, Test Point Overview, and Waveforms

Wiring Diagram  
WIRING 42"- 50" PDP



Block Diagram Supply PDP 42" & 50"  
**SUPPLY PDP 42"- 50"**



**CN8001**

- 1 AC\_L
- 2 AC\_N

**1C01**

**CN8009**

- 1 VSND\_NEG
- 2 VSND\_POS
- 3 GND\_SND
- 4 5Vstb
- 5 5Vsw
- 6 5Vsw
- 7 GND\_SSP
- 8 GND\_SSP
- 9 GND\_SSP

**1P11**

**CN8010**

- 1 N.C
- 2 Power\_ok
- 3 N.C
- 4 GND\_SSP
- 5 N.C
- 6 STANDBY
- 7 N.C
- 8 12Vssb

**CN8006**

- 1 Vg
- 2 GND\_SSP
- 3 GND\_SSP
- 4 GND\_SSP
- 5 Vs
- 6 Vs

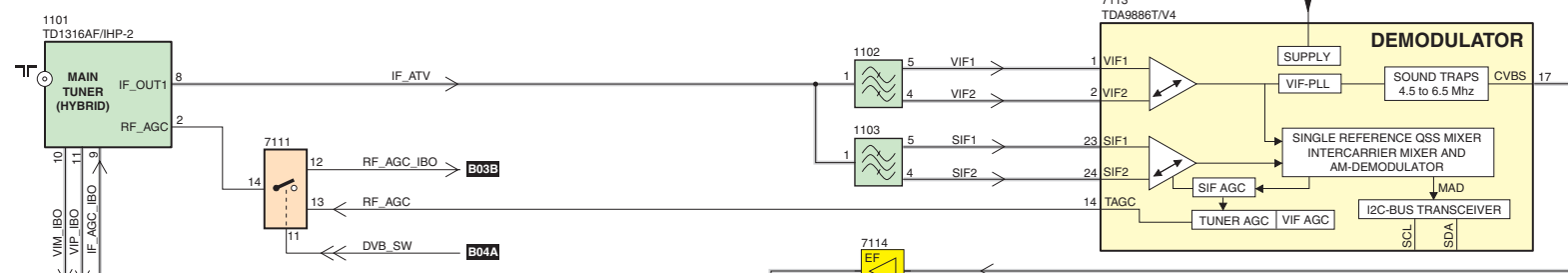
**CN8007**

- 1 Vg
- 2 GND\_SSP
- 3 GND\_SSP
- 4 Vs
- 5 Vs

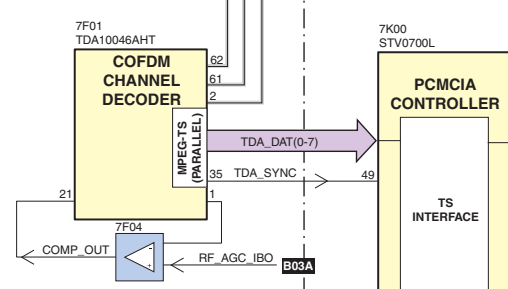
# Block Diagram Video

## VIDEO

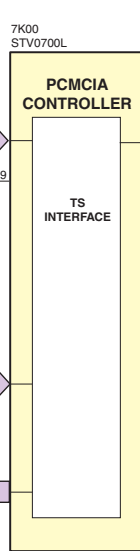
### B03A TUNER IF & DEMODULATOR



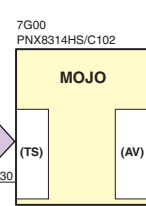
### B03B DVB-DEMODULATOR



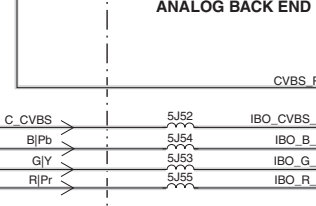
### B03C DVB-COMMON INTERFACE



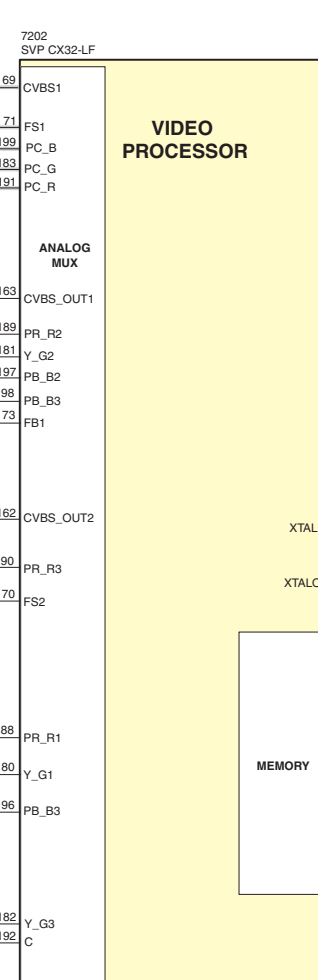
### B03D DVB-MOJO



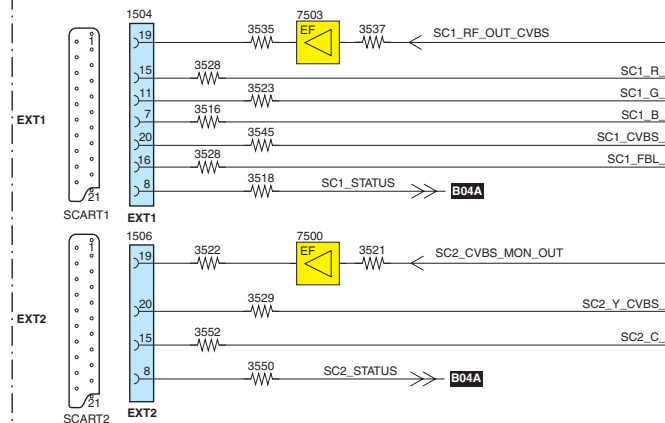
### B03F DVB-MOJO ANALOG BACK END



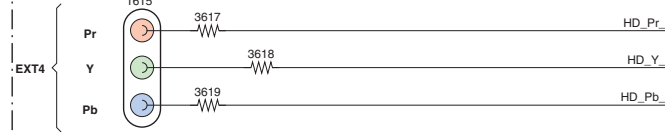
### B04B VIDEO PROCESSOR



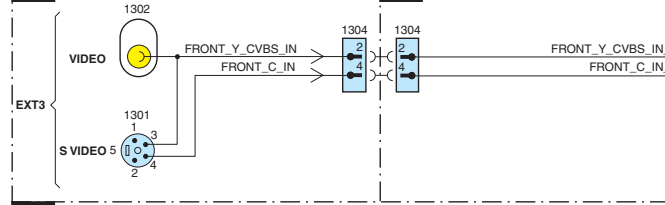
### B06B IO - SCART 1 & 2



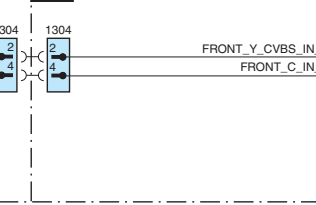
### B06A YPBPR & REAR IO



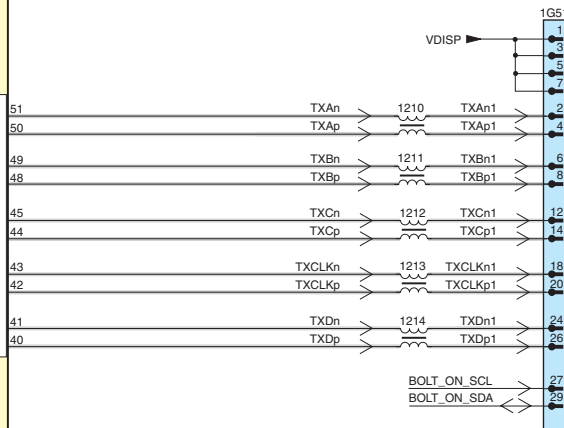
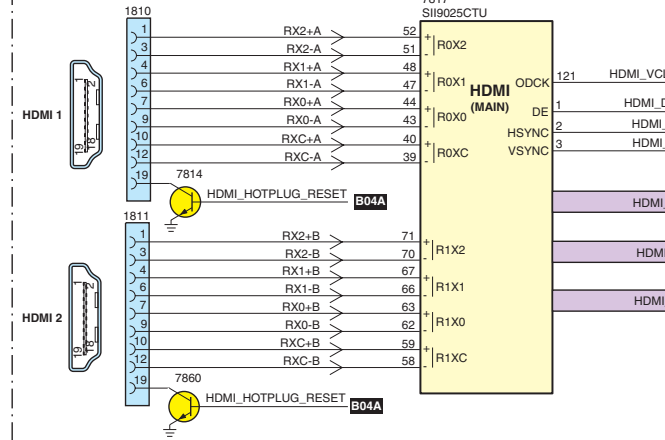
### D SIDE FACING SIDE AV



### B04A MICROPROCESSOR

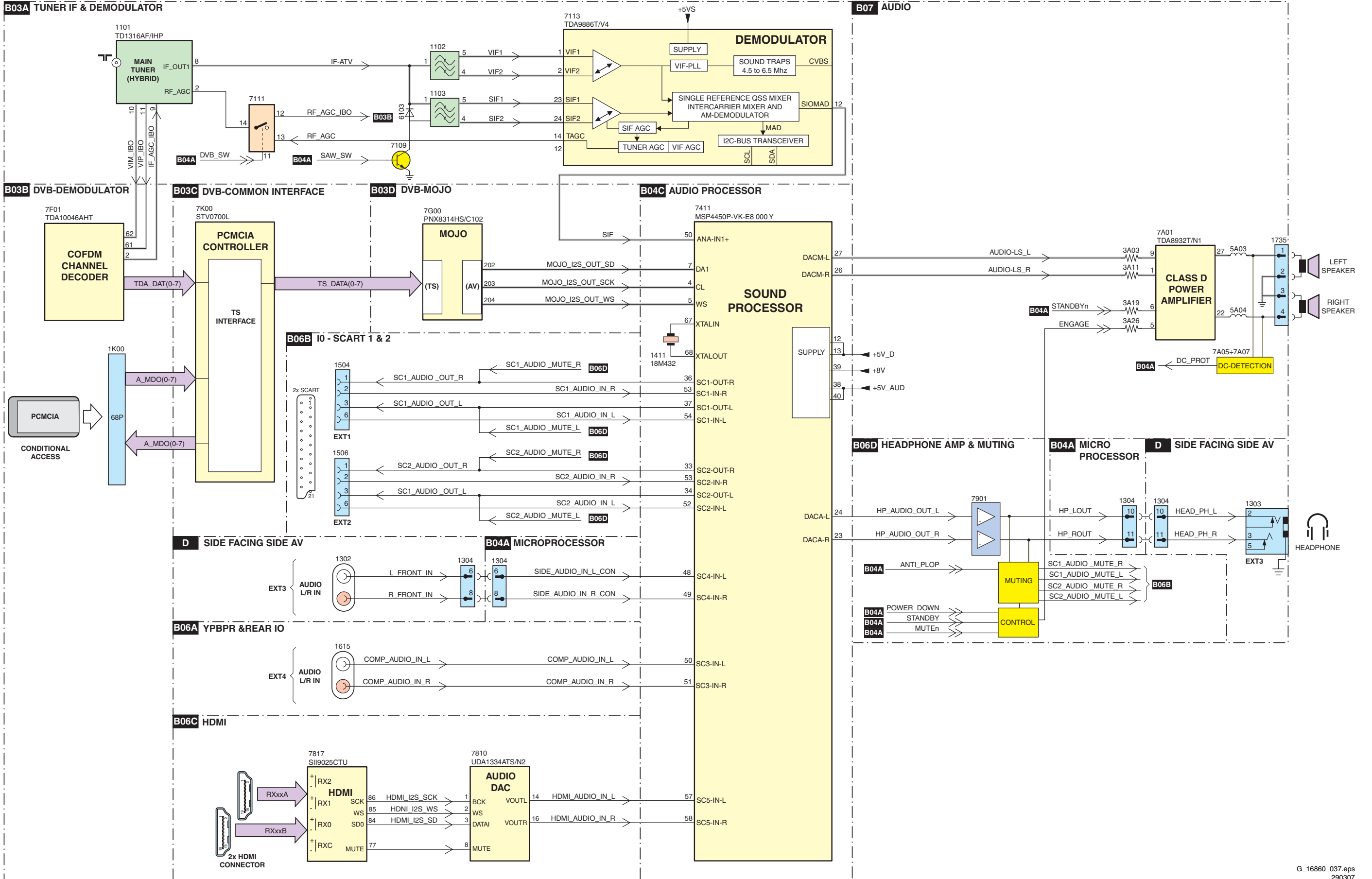


### B06C HDMI

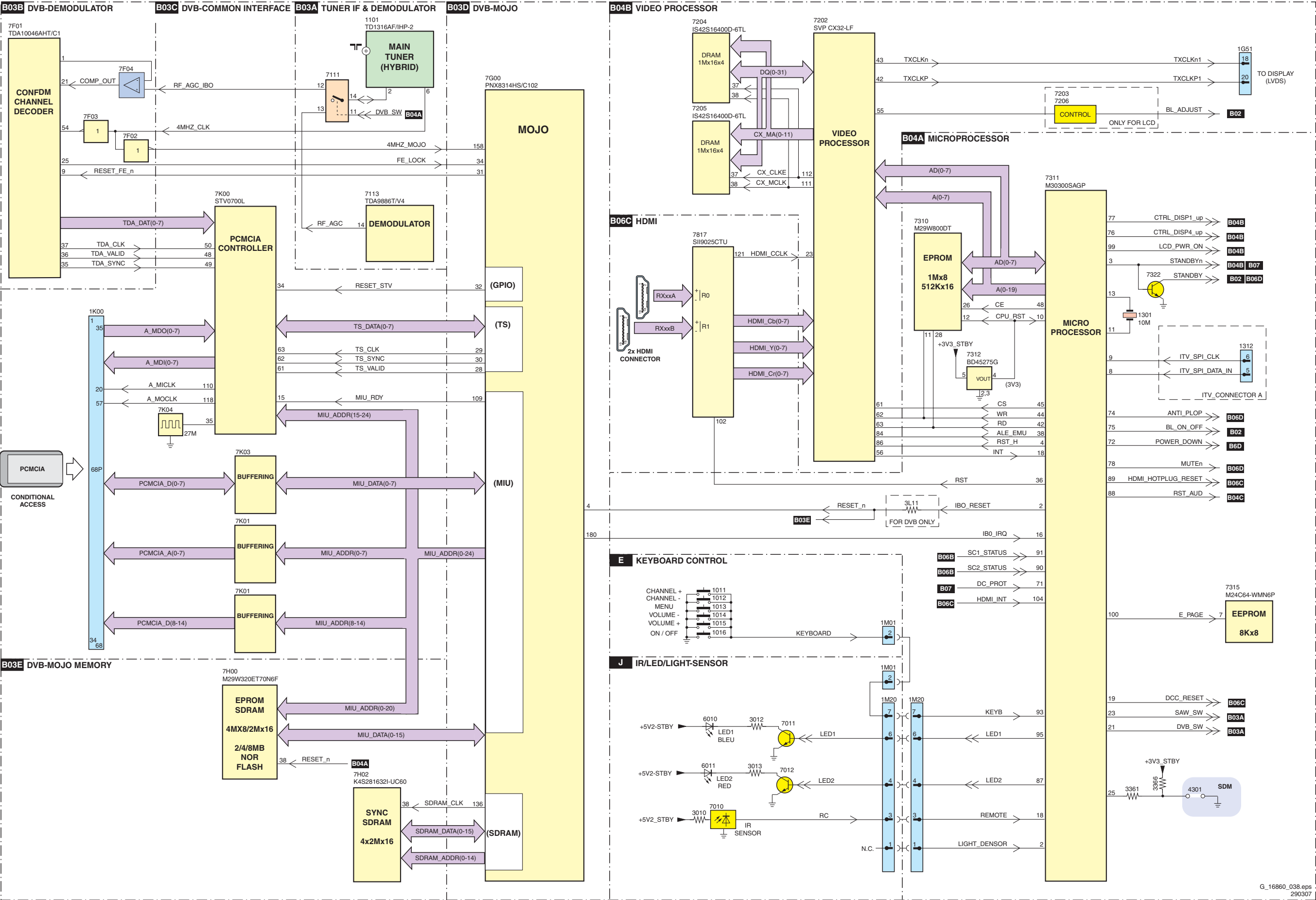


# Block Diagram Audio

## AUDIO



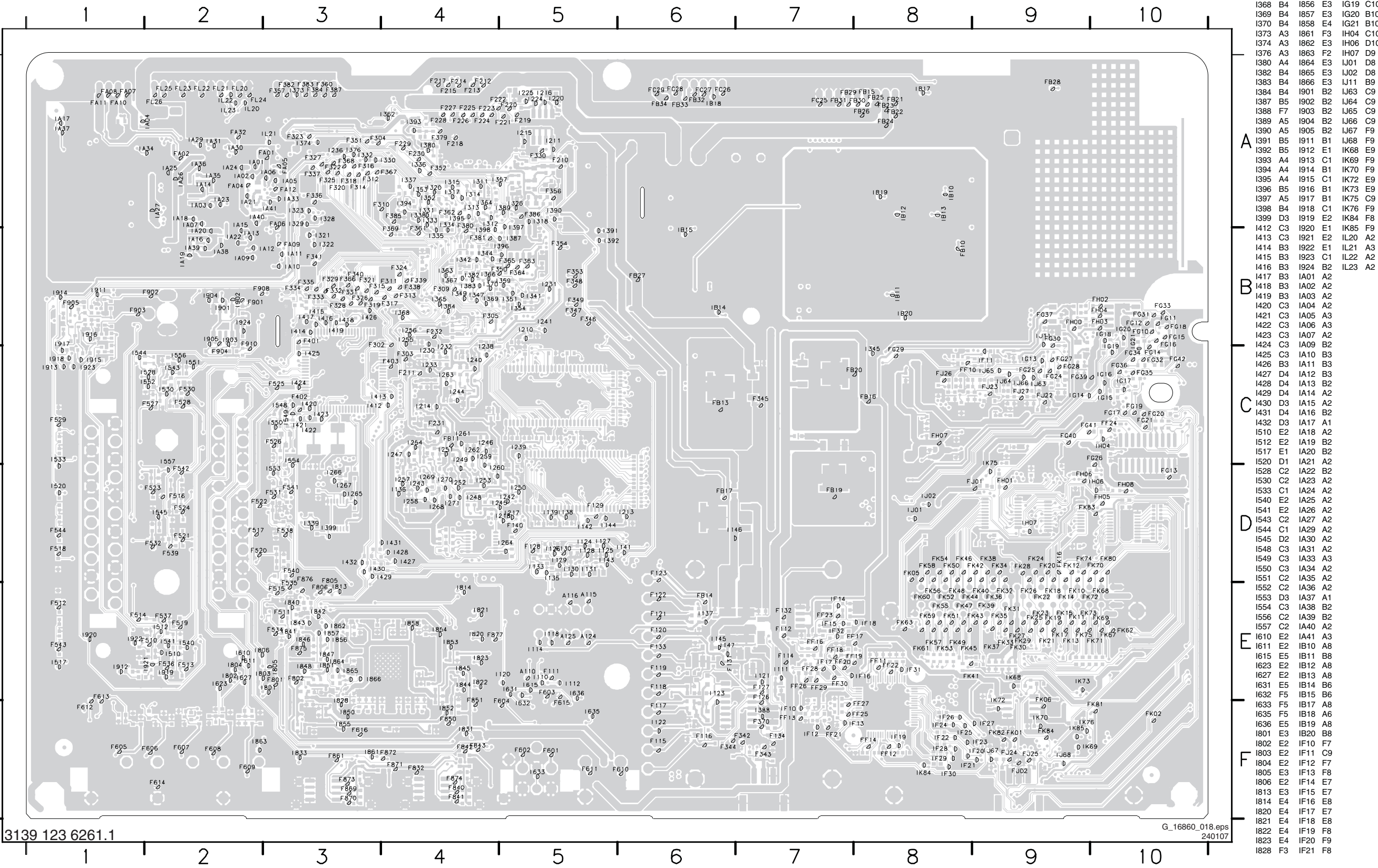
Block Diagram Control & Clock Signals  
CONTROL & CLOCK SIGNALS



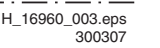


Test Point Overview SSB (Bottom Side)

|         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |          |          |          |         |         |          |          |         |         |         |         |         |         |         |         |          |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|---------|---------|----------|----------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| A110 E5 | F126 E7 | F218 A4 | F304 A3 | F324 B4 | F341 B3 | F361 B4 | F386 A5 | F522 D2 | F540 D3 | F613 E1 | F870 F3 | FA04 A2 | FB19 D7 | FC26 A6 | FF24 C10 | FG20 C10 | FG40 C9  | FJ25 F9  | FK20 D9 | FK37 E9 | FK54 D8  | FK74 D9  | I114 E5 | I137 E6 | I218 D5 | I246 C4 | I263 C4 | I321 B3 | I342 B4 | I831 F4 | IF22 F8  |
| A115 E5 | F127 E7 | F219 A5 | F305 B4 | F325 A3 | F342 F7 | F362 A4 | F387 A3 | F523 D2 | F541 D3 | F614 F2 | F871 F4 | FA05 A3 | FB20 C8 | FC27 A6 | FF25 F8  | FG21 C10 | FG41 C9  | FJ26 C8  | FK21 E9 | FK38 D9 | FK55 E8  | FK75 E9  | I118 E5 | I138 D5 | I220 A5 | I247 C4 | I264 D5 | I322 B3 | I344 B4 | I832 F3 | IF23 F9  |
| A116 E5 | F128 D5 | F220 A5 | F309 B4 | F326 B3 | F343 F7 | F363 B5 | F401 B3 | F524 D2 | F542 D2 | F615 F5 | F872 F4 | FA06 A3 | FB21 A8 | FC28 A6 | FF26 E7  | FG24 C9  | FG42 C10 | FJ27 C9  | FK22 E9 | FK39 E9 | FK56 E8  | FK80 D10 | I120 E5 | I139 D5 | I224 A5 | I248 D4 | I265 D3 | I323 A3 | I345 C8 | I840 C3 | IF24 F8  |
| A124 E5 | F129 D5 | F221 A5 | F310 A4 | F327 A3 | F344 F6 | F364 B5 | F402 C3 | F525 C3 | F543 E1 | F616 F3 | F873 F3 | FA07 A1 | FB22 A8 | FC29 A6 | FF27 F8  | FG25 C9  | FH00 B9  | FK01 F9  | FK23 E9 | FK40 E9 | FK57 E8  | FK81 F10 | I121 E7 | I141 D6 | I225 A5 | I249 C4 | I266 D3 | I326 A5 | I347 B4 | I841 E3 | IF25 F8  |
| A125 E5 | F130 D5 | F222 A4 | F311 B4 | F328 B3 | F345 C7 | F365 B5 | F403 C4 | F526 C3 | F544 D1 | F601 F5 | F802 E3 | FA08 A1 | FB23 A8 | FF10 C8 | FF28 E7  | FG26 C10 | FH01 D9  | FK02 F10 | FK24 D9 | FK41 E8 | FK58 D8  | FK82 F9  | I122 F6 | I142 D5 | I230 C4 | I250 D5 | I267 D3 | I328 A3 | I349 B4 | I842 E3 | IF26 F8  |
| F111 E5 | F131 E6 | F223 A4 | F312 A3 | F329 B3 | F346 B5 | F366 B3 | F510 E2 | F527 C2 | F601 F5 | F802 E3 | F875 E3 | FA09 B3 | FB24 A8 | FF11 E8 | FF29 E7  | FG27 C9  | FH02 B10 | FK05 D8  | FK25 E9 | FK42 D9 | FK59 E8  | FK83 D9  | I123 E6 | I143 D5 | I231 B5 | I251 C4 | I268 D4 | I329 A3 | I351 B5 | I843 E3 | IF27 F9  |
| F112 E7 | F132 E7 | F224 A4 | F313 B4 | F330 A5 | F347 B5 | F367 A4 | F511 E3 | F528 C2 | F602 F5 | F805 D3 | F876 D3 | FA10 A1 | FB25 A8 | FF12 F8 | FF30 E7  | FG28 C9  | FH03 B10 | FK06 E9  | FK26 E9 | FK43 E9 | FK60 E8  | FK84 F9  | I124 D5 | I144 D5 | I232 C4 | I252 D4 | I269 D4 | I330 A4 | I352 A4 | I844 E4 | IF28 F8  |
| F114 E7 | F133 E6 | F225 A4 | F314 A3 | F331 B3 | F348 B5 | F368 A4 | F512 E1 | F529 C1 | F603 E5 | F806 E3 | F877 E4 | FA11 A1 | FB26 A8 | FF13 F7 | FF10 B10 | FG29 C8  | FH04 B10 | FK10 E9  | FK27 E9 | FK44 E8 | FK61 E8  | FL20 A2  | I125 D5 | I145 E6 | I233 C4 | I253 D4 | I270 D4 | I331 A4 | I353 A4 | I845 E4 | IF29 F8  |
| F115 F6 | F134 F7 | F226 A4 | F315 B3 | F332 B3 | F349 B5 | F369 B4 | F513 E2 | F530 C2 | F604 F5 | F832 F4 | F901 B2 | FA12 A3 | FB27 B6 | FF14 F8 | FG11 B10 | FG30 B9  | FH05 D10 | FK11 E9  | FK28 D9 | FK45 E8 | FK62 E10 | FL21 A2  | I126 D5 | I146 D6 | I236 A3 | I254 C4 | I271 D4 | I332 A3 | I354 B5 | I846 E3 | IF30 F8  |
| F116 F6 | F140 D5 | F227 A4 | F316 A3 | F333 B3 | F350 B5 | F370 F7 | F514 E1 | F531 D3 | F605 F1 | F840 F4 | F902 B2 | FA32 A2 | FB28 A9 | FF16 E7 | FG12 B10 | FG31 B10 | FH06 D9  | FK12 D9  | FK29 E9 | FK46 D8 | FK63 E8  | FL22 A2  | I127 D5 | I147 E6 | I238 C4 | I255 B4 | I311 A4 | I333 A4 | I357 A5 | I847 E3 | IF31 E8  |
| F117 F6 | F210 A5 | F228 A4 | F317 B4 | F334 B3 | F351 A3 | F379 A4 | F515 E3 | F532 D2 | F606 F2 | F841 F4 | F903 B1 | FB10 B8 | FB29 A7 | FF17 E8 | FG13 D10 | FG32 C10 | FH07 C8  | FK13 E9  | FK30 E9 | FK47 E8 | FK67 E10 | FL23 A2  | I128 D5 | I210 B5 | I239 C5 | I256 B4 | I312 A4 | I334 A4 | I359 B5 | I848 E3 | IF32 E7  |
| F118 E6 | F211 C4 | F229 A4 | F318 A3 | F335 B3 | F352 A4 | F380 A4 | F516 D2 | F534 E3 | F607 F2 | F842 F4 | F904 C2 | FB11 C4 | FB30 A8 | FF18 E7 | FG14 C10 | FG33 B10 | FH08 D10 | FK14 E9  | FK31 E9 | FK48 E8 | FK68 E10 | FL24 A2  | I129 D5 | I211 A5 | I240 C4 | I257 D4 | I313 A4 | I335 B4 | I362 A4 | I850 F3 | IG13 C9  |
| F119 E6 | F212 A4 | F230 A4 | F319 B3 | F336 A3 | F353 B5 | F381 B4 | F517 D2 | F535 E3 | F608 F2 | F843 F4 | F905 B1 | FB13 C6 | FB31 A7 | FF19 E8 | FG15 B10 | FG34 C10 | FJ01 D9  | FK15 E9  | FK32 E9 | FK49 E8 | FK69 E10 | FL25 A2  | I130 D5 | I213 D6 | I241 B5 | I258 D4 | I314 A4 | I336 A4 | I363 B4 | I851 E3 | IG14 C9  |
| F120 E6 | F213 A4 | F231 C4 | F320 A3 | F337 A3 | F354 B5 | F382 A3 | F518 D1 | F536 E2 | F609 F2 | F850 F4 | F908 B2 | FB14 E6 | FB32 A6 | FF20 E7 | FG16 B10 | FG35 C10 | FJ02 F9  | FK16 D9  | FK33 E9 | FK50 D8 | FK70 D10 | FL26 A2  | I131 D5 | I214 C4 | I242 D5 | I259 C4 | I315 A4 | I337 A4 | I364 A4 | I852 F4 | IG15 C10 |
| F121 E6 | F214 A4 | F232 B4 | F321 B3 | F338 B4 | F356 A5 | F383 A3 | F519 E2 | F537 E2 | F610 F6 | F851 F4 | F910 B2 | FB15 A8 | FB33 A6 | FF21 F7 | FG17 C10 | FG36 C10 | FJ22 C9  | FK17 E9  | FK34 D9 | FK51 E8 | FK71 E10 | I110 E5  | I133 D5 | I215 A5 | I243 D4 | I260 D4 | I317 A4 | I338 A4 | I365 B4 | I853 E4 | IG16 C10 |
| F122 E6 | F215 A4 | F302 B3 | F322 A3 | F339 B4 | F357 A3 | F384 A3 | F520 D2 | F538 D3 | F611 F5 | F861 F3 | F901 A3 | FB16 C8 | FB34 A6 | FF22 E8 | FG18 B10 | FG37 B9  | FJ23 C9  | FK18 E9  | FK35 E9 | FK52 E8 | FK72 E10 | I111 E7  | I135 D5 | I216 A5 | I244 C4 | I261 C4 | I318 A5 | I339 D3 | I366 B4 | I854 E4 | IG17 C10 |
| F123 D6 | F217 A4 | F303 C4 | F323 A3 | F340 B3 | F360 A3 | F385 A4 | F521 D2 | F539 D2 | F612 F1 | F869 F3 | FA02 A2 | FB17 D6 | FC25 A7 | FF23 E7 | FG19 C10 | FG39 C9  | FJ24 F9  | FK19 E9  | FK36 E9 | FK53 E8 | FK73 E9  | I112 E5  | I136 D4 | I217 D5 | I245 D5 | I262 C4 | I320 A4 | I341 B5 | I367 B4 | I855 F3 | IG18 B10 |

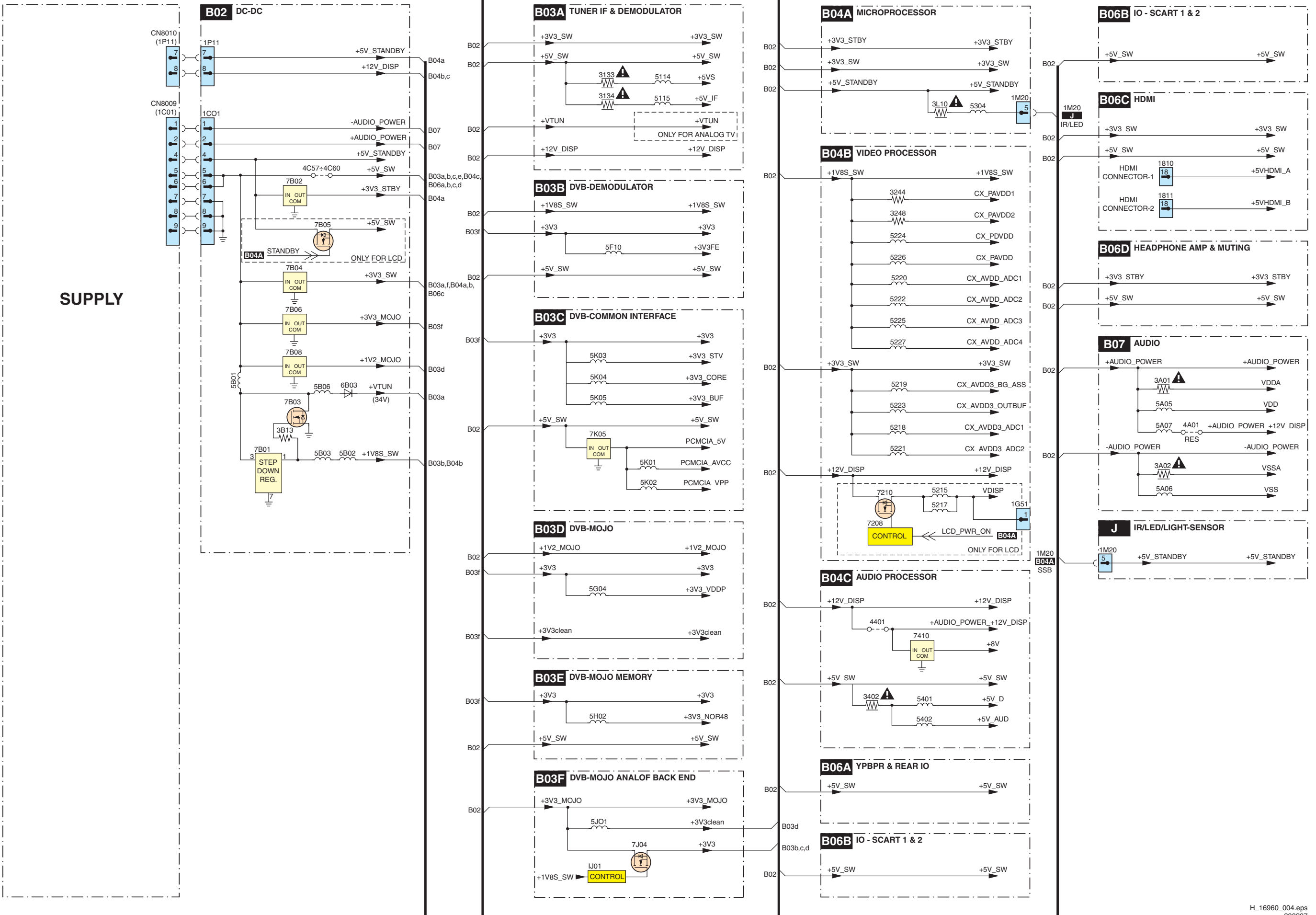


**I<sup>2</sup>C**



# Supply Lines Overview

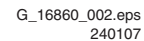
## SUPPLY LINES OVERVIEW







## B03A TUNER IF & DEMODULATOR

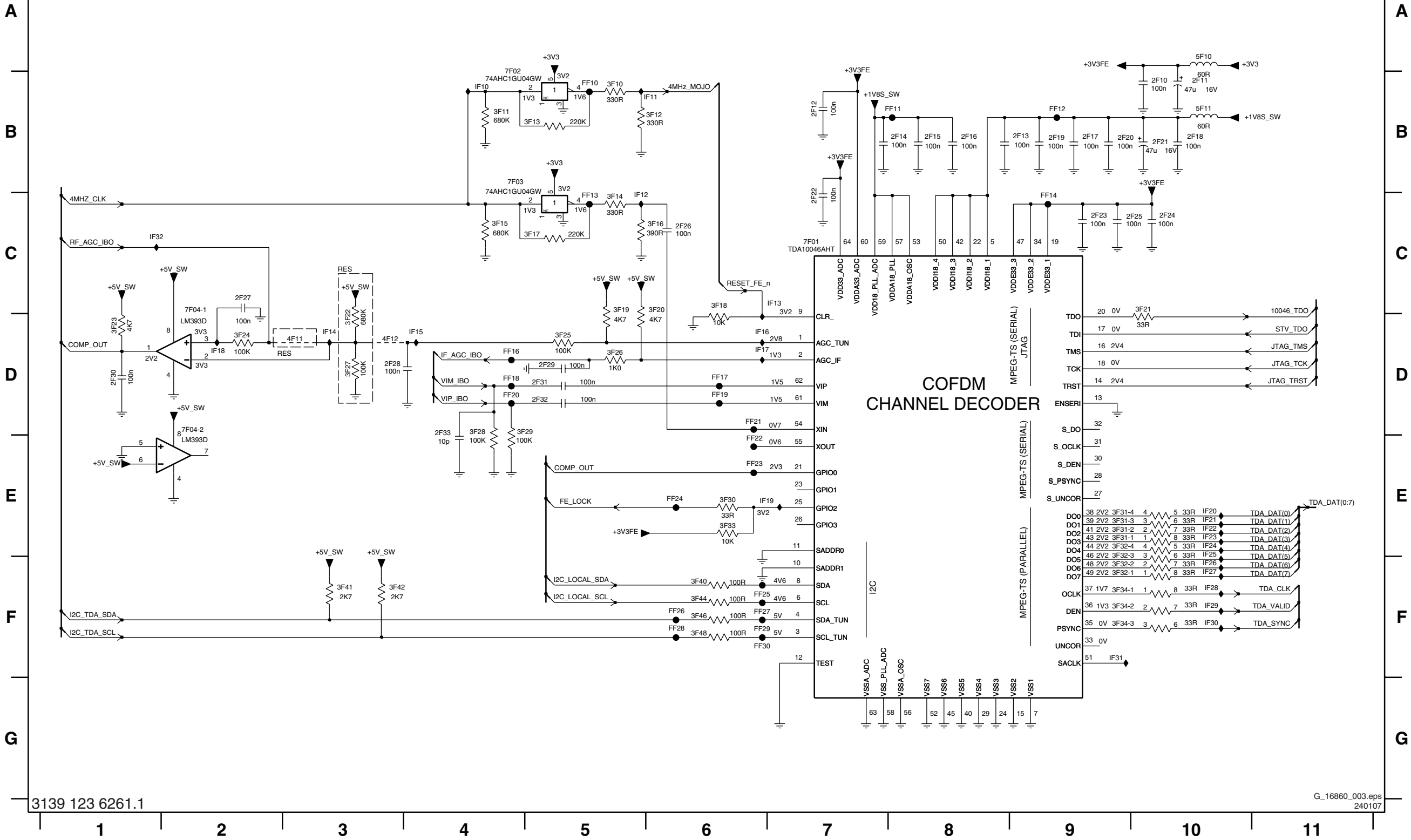


|     |     |     |
|-----|-----|-----|
| 101 | A10 | B1  |
| 102 | A15 | B5  |
| 103 | A16 | B5  |
| 104 | A14 | C5  |
| 210 | A12 | C5  |
| 211 | F11 | B3  |
| 212 | B1  | B6  |
| 213 | B10 | H10 |
| 214 | B2  | B7  |
| 215 | B6  | B7  |
| 216 | B7  | B7  |
| 217 | C3  | B7  |
| 218 | C10 | B7  |
| 219 | C8  | B7  |
| 220 | C9  | B7  |
| 221 | E7  | B7  |
| 222 | F7  | B7  |
| 223 | F3  | C7  |
| 224 | F2  | C7  |
| 225 | F3  | F2  |
| 226 | F3  | H11 |
| 227 | F5  | G6  |
| 228 | F7  | H11 |
| 229 | H11 | B6  |
| 230 | H11 | B9  |
| 231 | I11 | A8  |
| 232 | I11 | G8  |
| 233 | G6  | B2  |
| 234 | H7  | A12 |
| 235 | H8  | B3  |
| 236 | H6  | A4  |
| 237 | H5  | A4  |
| 238 | H2  | D2  |
| 239 | H5  | D1  |
| 240 | I3  | D7  |
| 241 | I3  | E10 |
| 242 | C9  | E3  |
| 243 | F5  | F4  |
| 244 | I3  | F3  |
| 245 | I3  | F3  |
| 246 | B6  | G6  |
| 247 | A8  | G6  |
| 248 | A9  | H6  |
| 249 | B11 | H5  |
| 251 | C9  | I3  |
| 310 | A12 | I3  |
| 311 | A1  | I3  |
| 313 | B2  | B7  |
| 315 | B3  | B7  |
| 316 | B3  | G7  |
| 317 | C3  | I4  |
| 318 | D2  | F5  |
| 319 | D1  | I3  |
| 320 | D8  | H4  |
| 321 | E8  | A9  |
| 322 | E3  | A8  |
| 323 | E3  | A8  |
| 324 | E2  |     |
| 325 | G7  |     |
| 326 | H7  |     |
| 327 | H6  |     |
| 328 | A4  |     |
| 329 | I3  |     |
| 330 | B8  |     |
| 331 | D10 |     |
| 332 | E10 |     |
| 333 | H10 |     |
| 334 | H10 |     |
| 335 | F7  |     |
| 336 | A8  |     |
| 337 | A9  |     |
| 410 | B2  |     |
| 411 | B2  |     |
| 412 | B6  |     |
| 413 | B8  |     |
| 414 | C7  |     |
| 415 | C7  |     |
| 416 | C7  |     |
| 417 | C7  |     |
| 418 | C7  |     |
| 419 | C7  |     |
| 420 | D8  |     |
| 421 | D10 |     |
| 422 | E10 |     |
| 423 | D7  |     |
| 424 | G8  |     |
| 512 | B11 |     |
| 515 | B1  |     |
| 511 | B1  |     |
| 512 | B9  |     |
| 513 | C5  |     |
| 514 | H11 |     |
| 515 | H11 |     |
| 516 | G8  |     |
| 517 | B5  |     |
| 518 | A8  |     |
| 520 | D8  |     |
| 521 | E8  |     |
| 613 | C3  |     |
| 610 | A11 |     |
| 709 | D2  |     |
| 711 | B10 |     |
| 713 | F2  |     |
| 714 | F7  |     |
| 731 | D11 |     |
| 732 | E11 |     |
| 733 | A8  |     |

SSB: DVB - Demodulator

B03B DVB - DEMODULATOR

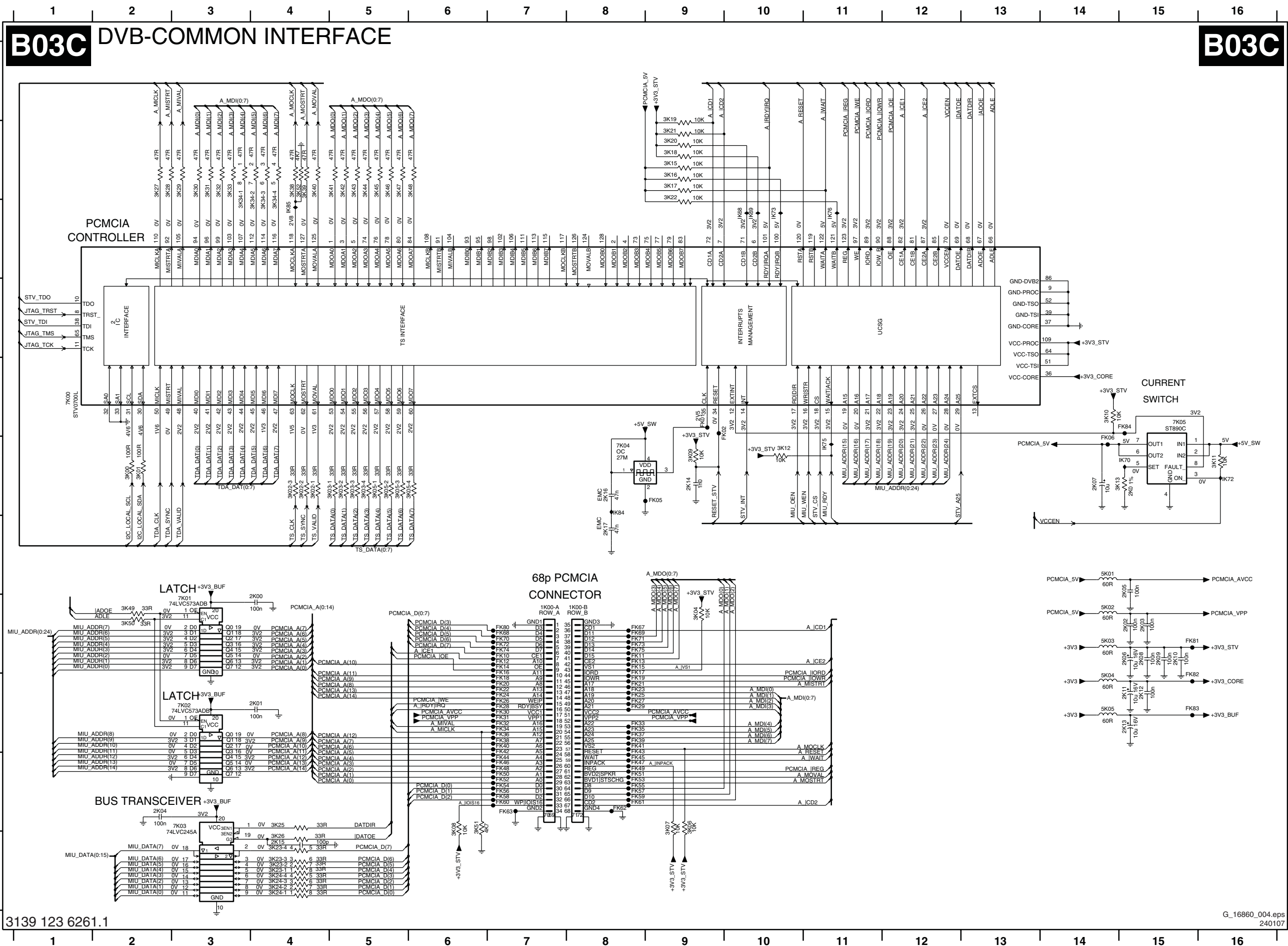
B03B



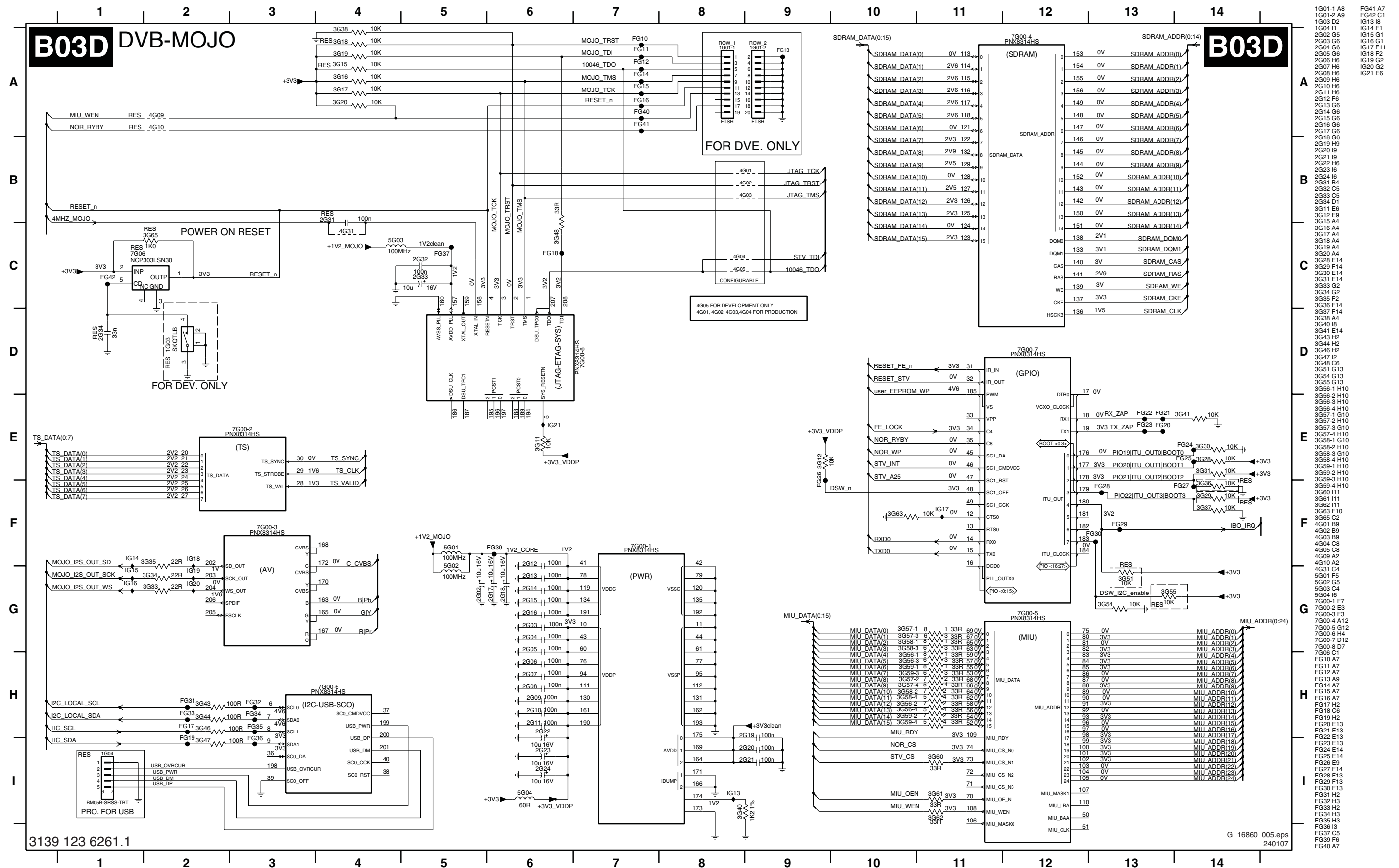
|           |          |
|-----------|----------|
| 2F10 B10  | FF25 F6  |
| 2F11 B10  | FF26 F6  |
| 2F12 B7   | FF27 F6  |
| 2F13 B9   | FF28 F6  |
| 2F14 B8   | FF29 F6  |
| 2F15 B8   | FF30 F6  |
| 2F16 B8   | IF10 B4  |
| 2F17 B9   | IF11 B6  |
| 2F18 B10  | IF12 C5  |
| 2F19 B9   | IF13 C7  |
| 2F20 B9   | IF14 D3  |
| 2F21 B10  | IF15 D4  |
| 2F22 C7   | IF16 D6  |
| 2F23 C9   | IF17 D6  |
| 2F24 C10  | IF18 D2  |
| 2F25 C10  | IF19 E6  |
| 2F26 C6   | IF20 E10 |
| 2F27 C2   | IF21 E10 |
| 2F28 D3   | IF22 E10 |
| 2F29 D5   | IF23 E10 |
| 2F30 D1   | IF24 E10 |
| 2F31 D5   | IF25 E10 |
| 2F32 D5   | IF26 F10 |
| 2F33 D4   | IF27 F10 |
| 3F10 B5   | IF28 F10 |
| 3F11 B4   | IF29 F10 |
| 3F12 B6   | IF30 F10 |
| 3F13 B5   | IF31 F9  |
| 3F14 C5   | IF32 C1  |
| 3F15 C4   |          |
| 3F16 C6   |          |
| 3F17 C5   |          |
| 3F18 C6   |          |
| 3F19 C5   |          |
| 3F20 C6   |          |
| 3F21 C10  |          |
| 3F22 D3   |          |
| 3F23 D1   |          |
| 3F24 D2   |          |
| 3F25 D5   |          |
| 3F26 D5   |          |
| 3F27 D3   |          |
| 3F28 D4   |          |
| 3F29 D5   |          |
| 3F30 E6   |          |
| 3F31-1 E9 |          |
| 3F31-2 E9 |          |
| 3F31-3 E9 |          |
| 3F31-4 E9 |          |
| 3F32-1 F9 |          |
| 3F32-2 F9 |          |
| 3F32-3 F9 |          |
| 3F32-4 E9 |          |
| 3F33 E6   |          |
| 3F34-1 F9 |          |
| 3F34-2 F9 |          |
| 3F34-3 F9 |          |
| 3F40 F6   |          |
| 3F41 F3   |          |
| 3F42 F3   |          |
| 3F44 F6   |          |
| 3F46 F6   |          |
| 3F48 F6   |          |
| 4F11 D3   |          |
| 4F12 D3   |          |
| 5F10 A10  |          |
| 5F11 B10  |          |
| 7F01 C7   |          |
| 7F02 B4   |          |
| 7F03 B4   |          |
| 7F04-1 C2 |          |
| 7F04-2 D2 |          |
| FF10 B5   |          |
| FF11 B8   |          |
| FF12 B9   |          |
| FF13 C5   |          |
| FF14 C9   |          |
| FF16 D4   |          |
| FF17 D6   |          |
| FF18 D4   |          |
| FF19 D6   |          |
| FF20 D4   |          |
| FF21 D6   |          |
| FF22 E6   |          |
| FF23 E6   |          |
| FF24 E6   |          |



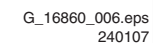
## SSB: DVB - Common Interface



**B03D** DVB-MOJO



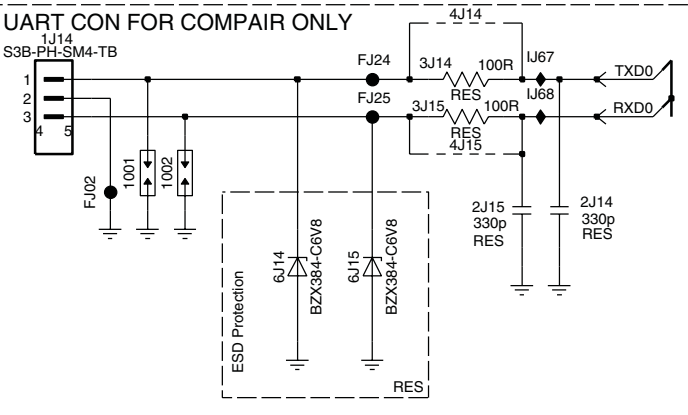
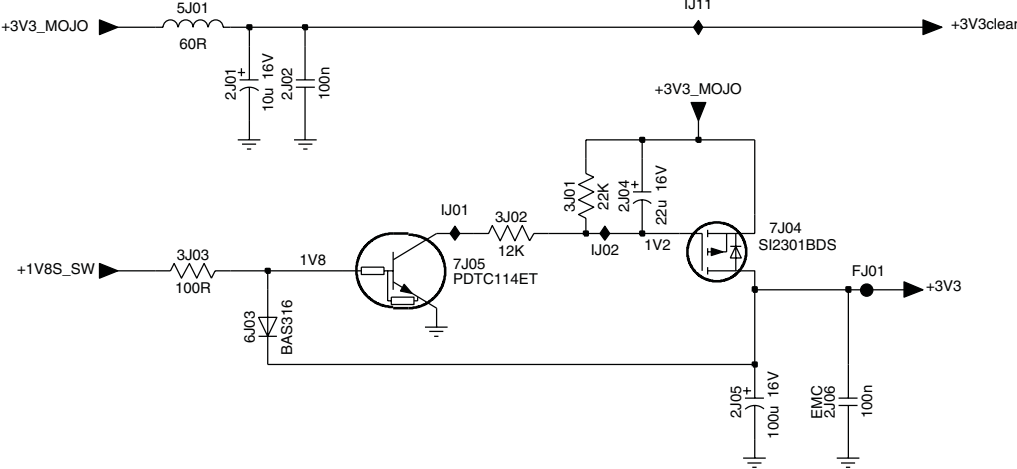
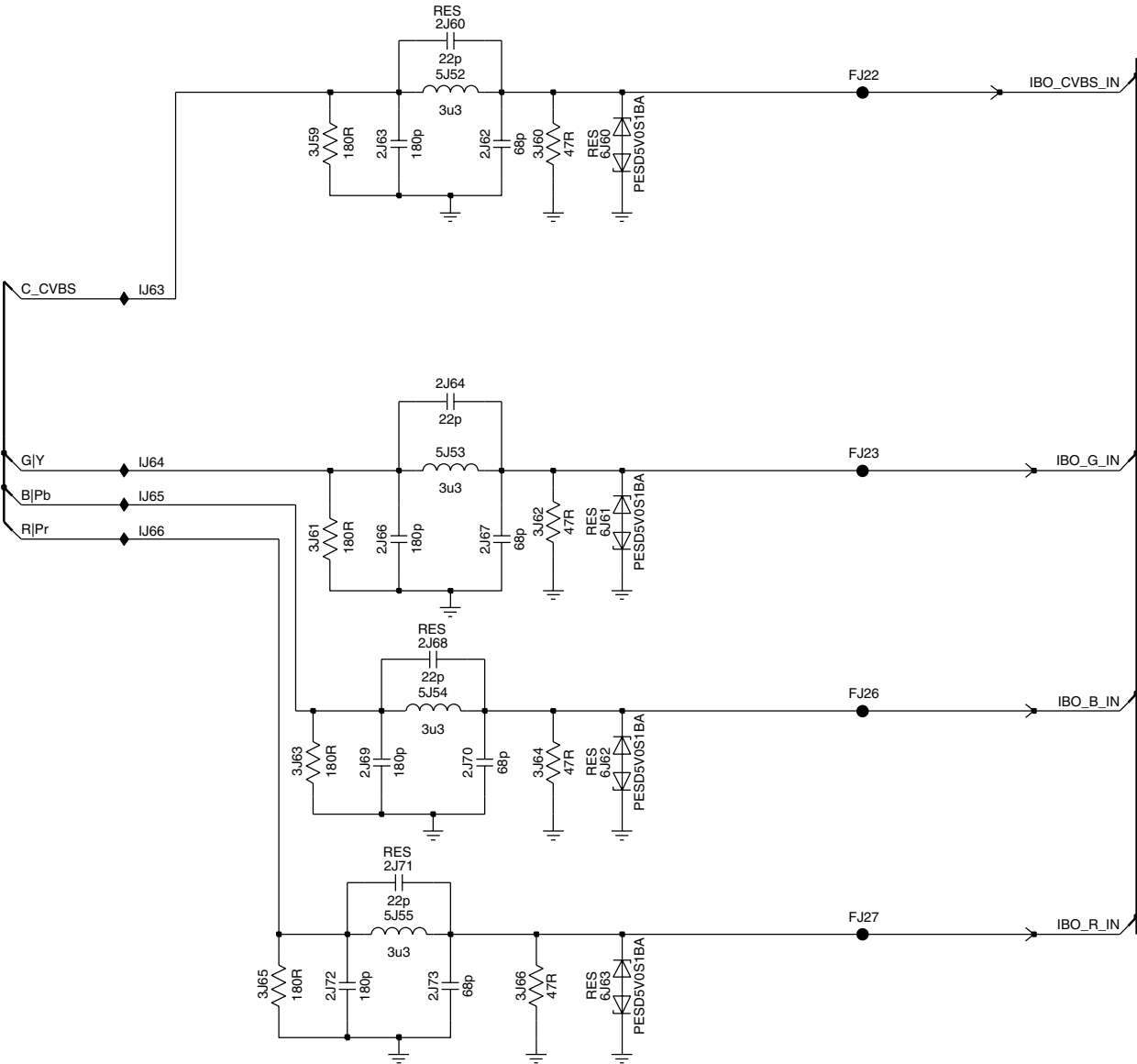
## B03E DVB-MOJO MEMORY



SSB: DVB - Mojo Analog Back End

B03F DVB-MOJO ANALOG BACK END

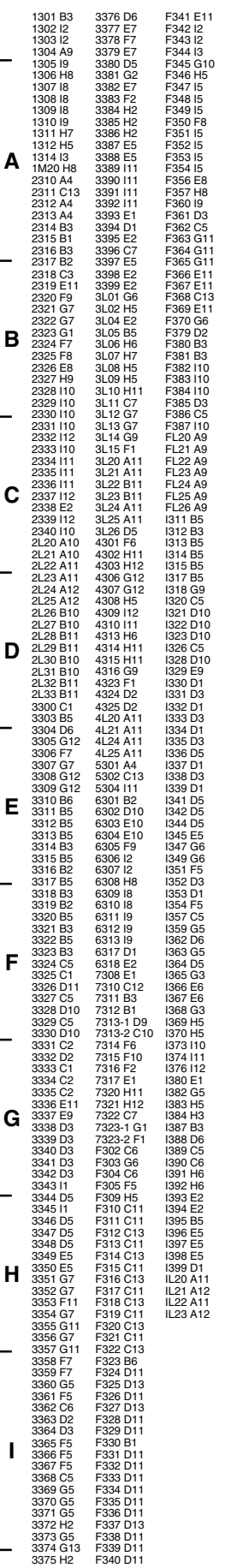
B03F



- 1001 D7
- 1002 D7
- 1J14 D6
- 2J01 B7
- 2J02 B7
- 2J04 B8
- 2J05 C8
- 2J06 C9
- 2J14 D8
- 2J15 D8
- 2J60 A2
- 2J62 B3
- 2J63 B2
- 2J64 C2
- 2J66 C2
- 2J67 C3
- 2J68 D2
- 2J69 D2
- 2J70 D3
- 2J71 E2
- 2J72 E2
- 2J73 E2
- 3J01 B8
- 3J02 B8
- 3J03 B6
- 3J14 D8
- 3J15 D8
- 3J59 B2
- 3J60 B3
- 3J61 C2
- 3J62 C3
- 3J63 D2
- 3J64 D3
- 3J65 E2
- 3J66 E3
- 4J14 D8
- 4J15 D8
- 5J01 A6
- 5J52 A2
- 5J53 C2
- 5J54 D2
- 5J55 E2
- 6J03 C7
- 6J14 D7
- 6J15 D8
- 6J60 B3
- 6J61 C3
- 6J62 D3
- 6J63 E3
- 7J04 B9
- 7J05 B7
- FJ01 B9
- FJ02 D6
- FJ22 A4
- FJ23 C4
- FJ24 D8
- FJ25 D8
- FJ26 D4
- FJ27 E4
- IJ01 B7
- IJ02 B8
- IJ11 A8
- IJ63 B1
- IJ64 C1
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- IJ67 D8
- IJ68 D8



# B04A MICROPROCESSOR



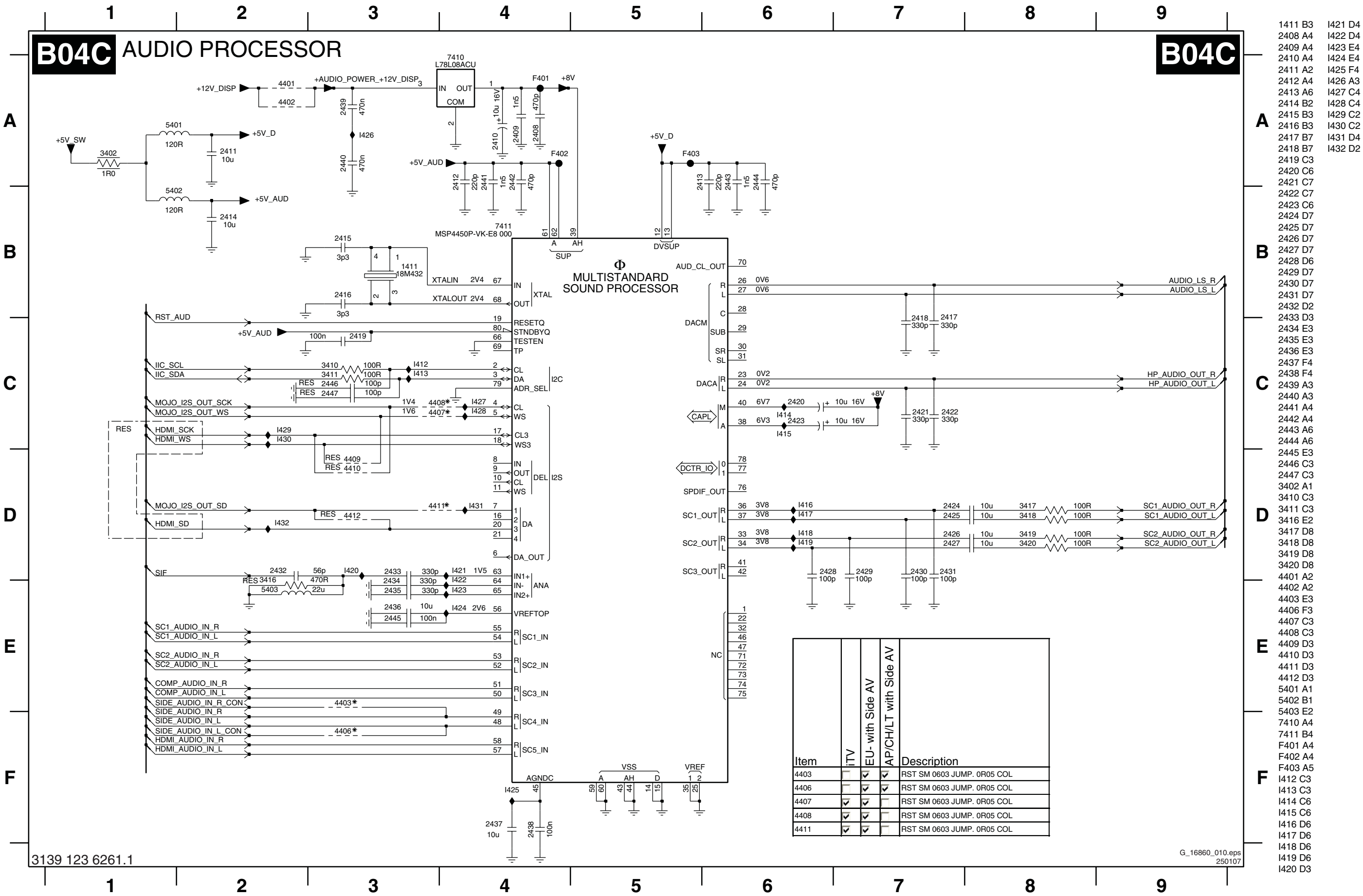


## B04B VIDEO PROCESSOR

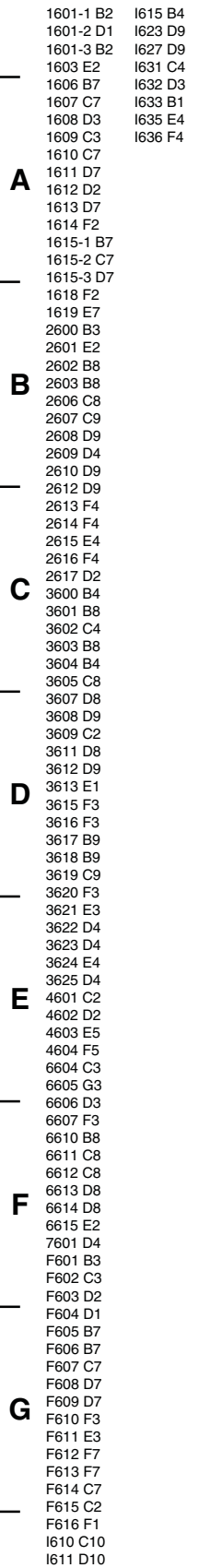
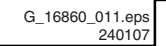


|      |     |      |     |      |     |
|------|-----|------|-----|------|-----|
| 1201 | A4  | 3241 | K9  | I232 | E4  |
| 1210 | H12 | 3242 | K9  | I233 | E4  |
| 1211 | H2  | 3243 | K9  | I236 | E15 |
| 1212 | A7  | 3244 | K7  | I238 | J4  |
| 1213 | J2  | 3245 | K8  | I239 | K4  |
| 1214 | J2  | 3246 | J4  | I240 | K8  |
| 1215 | L7  | 3247 | J4  | I241 | K9  |
| 1216 | A7  | 3248 | B2  | I242 | A6  |
| 1217 | A7  | 3250 | J2  | I243 | A7  |
| 1218 | H17 | 3251 | J3  | I244 | L8  |
| 1219 | K7  | 3252 | K2  | I245 | A4  |
| 1220 | K7  | 3253 | K2  | I246 | A9  |
| 1221 | B7  | 3255 | K3  | I247 | B7  |
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| 1223 | B7  | 3257 | J1  | I249 | B9  |
| 1224 | B17 | 3258 | K1  | I250 | A6  |
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| 1234 | B18 | 3262 | B12 | I260 | J10 |
| 1235 | B18 | 3262 | B12 | I261 | J10 |
| 1236 | B18 | 3262 | B12 | I262 | J10 |
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SSB: PNX2015: Audio Processor

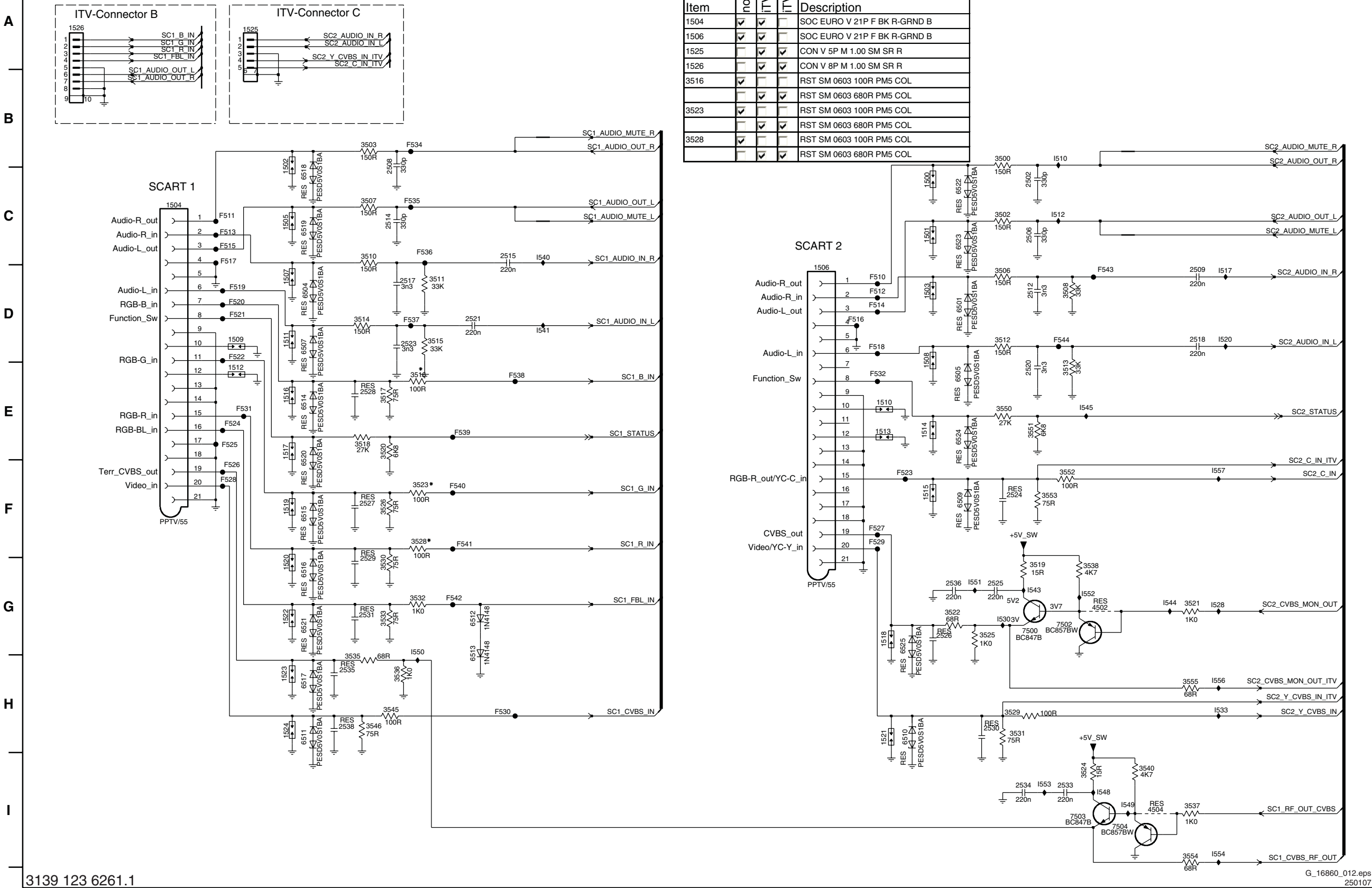


## B06A YPBPR & REAR IO



SSB: I/O Scart 1 & 2

B06B IO - SCART 1 & 2



| Item | non-ITV | ITV Analog | ITV-Digital | Description                  |
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| 1504 | ✓       | ✓          | ✓           | SOC EURO V 21P F BK R-GRND B |
| 1506 | ✓       | ✓          | ✓           | SOC EURO V 21P F BK R-GRND B |
| 1525 | ✓       | ✓          | ✓           | CON V 5P M 1.00 SM SR R      |
| 1526 | ✓       | ✓          | ✓           | CON V 8P M 1.00 SM SR R      |
| 3516 | ✓       | ✓          | ✓           | RST SM 0603 100R PM5 COL     |
|      | ✓       | ✓          | ✓           | RST SM 0603 680R PM5 COL     |
| 3523 | ✓       | ✓          | ✓           | RST SM 0603 100R PM5 COL     |
|      | ✓       | ✓          | ✓           | RST SM 0603 680R PM5 COL     |
| 3528 | ✓       | ✓          | ✓           | RST SM 0603 100R PM5 COL     |
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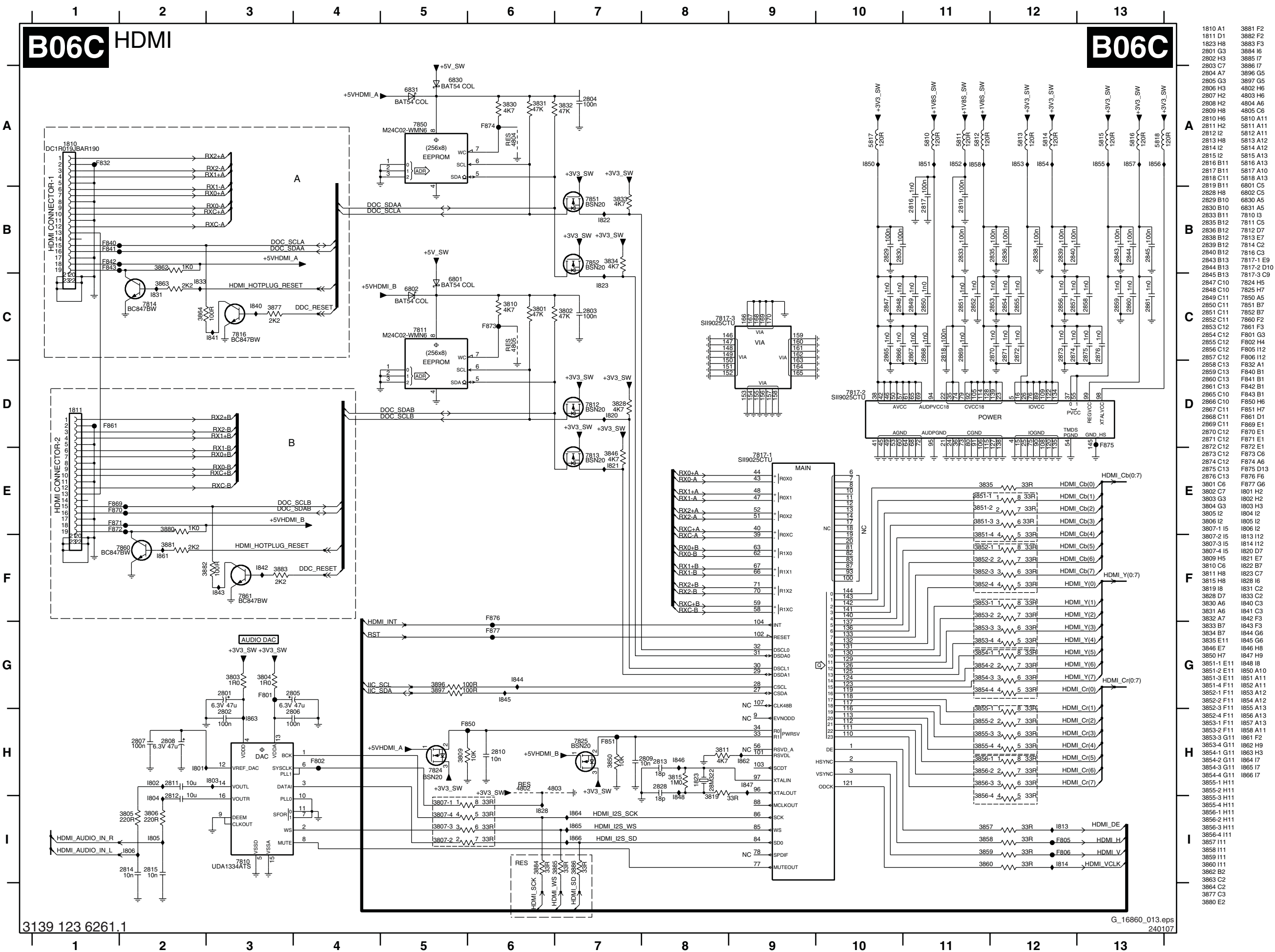
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- 1515 F9
- 1516 E3
- 1517 E3
- 1518 G9
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SSB: HDMI

B06C HDMI

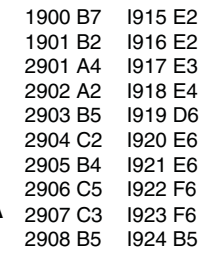
B06C



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| 2812 I2    | 5812 A11   |
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| 2873 C12   | 7873 C6    |
| 2874 C12   | 7874 A6    |
| 2875 C13   | 7875 D13   |
| 2876 C13   | 7876 F6    |
| 3801 C6    | 7877 G6    |
| 3802 C7    | 801 H2     |
| 3803 G3    | 802 H2     |
| 3804 G3    | 803 H3     |
| 3805 I2    | 804 I2     |
| 3806 I2    | 805 I2     |
| 3807-1 I5  | 806 I2     |
| 3807-2 I5  | 813 I12    |
| 3807-3 I5  | 814 I12    |
| 3807-4 I5  | 820 D7     |
| 3809 H5    | 821 E7     |
| 3810 C6    | 822 B7     |
| 3811 H8    | 823 C7     |
| 3815 H8    | 828 I6     |
| 3819 I8    | 831 C2     |
| 3828 D7    | 833 C2     |
| 3830 A6    | 840 C3     |
| 3831 A6    | 841 C3     |
| 3832 A7    | 842 F3     |
| 3833 B7    | 843 F3     |
| 3834 B7    | 844 G6     |
| 3835 E11   | 845 G6     |
| 3846 E7    | 846 H8     |
| 3850 H7    | 847 H8     |
| 3851-1 E11 | 848 I8     |
| 3851-2 E11 | 850 A10    |
| 3851-3 E11 | 851 A11    |
| 3851-4 F11 | 852 A11    |
| 3852-1 F11 | 853 A12    |
| 3852-2 F11 | 854 A12    |
| 3852-3 F11 | 855 A13    |
| 3852-4 F11 | 856 A13    |
| 3853-1 F11 | 857 A13    |
| 3853-2 F11 | 858 A11    |
| 3853-3 G11 | 861 F2     |
| 3853-4 G11 | 862 H9     |
| 3854-1 G11 | 863 H3     |
| 3854-2 G11 | 864 I7     |
| 3854-3 G11 | 865 I7     |
| 3854-4 G11 | 866 I7     |
| 3855-1 H11 |            |
| 3855-2 H11 |            |
| 3855-3 H11 |            |
| 3855-4 H11 |            |
| 3856-1 H11 |            |
| 3856-2 H11 |            |
| 3856-3 H11 |            |
| 3856-4 H11 |            |
| 3857 I11   |            |
| 3858 I11   |            |
| 3859 I11   |            |
| 3860 I11   |            |
| 3862 B2    |            |
| 3863 C2    |            |
| 3864 C2    |            |
| 3877 C3    |            |
| 3880 E2    |            |



## B06D HEADPHONE AMP & MUTING



| Item | EU ITV | non-ITV | US ITV | Description                  |
|------|--------|---------|--------|------------------------------|
| 1901 | ✓      | ✓       | ✓      | CON V 4P M 1.00 SM SR R      |
| 2901 | ✓      | ✓       | ✓      | CER1 0603 NP0 50V 33P COL    |
| 2902 | ✓      | ✓       | ✓      | CER2 0603 Y5V 10V 470N COL   |
| 2903 | ✓      | ✓       | ✓      | ELCAP SM 16V 100U PM20 COL R |
| 2904 | ✓      | ✓       | ✓      | CER2 0603 Y5V 10V 470N COL   |
| 2905 | ✓      | ✓       | ✓      | CER1 0603 NP0 50V 33P COL    |
| 2906 | ✓      | ✓       | ✓      | ELCAP SM 16V 100U PM20 COL R |
| 2907 | ✓      | ✓       | ✓      | CER2 0603 Y5V 10V 470N COL   |
| 2909 | ✓      | ✓       | ✓      | CER2 0603 X7R 50V 10N COL    |
| 2910 | ✓      | ✓       | ✓      | CER2 0603 X7R 50V 10N COL    |
| 2911 | ✓      | ✓       | ✓      | CER2 0603 X7R 50V 10N COL    |
| 2912 | ✓      | ✓       | ✓      | CER2 0603 X7R 50V 10N COL    |
| 3901 | ✓      | ✓       | ✓      | RST SM 0603 47K PM5 COL      |
| 3902 | ✓      | ✓       | ✓      | RST SM 0603 RC21 120K PM5 R  |
| 3904 | ✓      | ✓       | ✓      | RST SM 0603 33R PM5 COL      |
| 3905 | ✓      | ✓       | ✓      | RST SM 0603 47K PM5 COL      |
| 3906 | ✓      | ✓       | ✓      | RST SM 0603 100K PM5 COL     |
| 3907 | ✓      | ✓       | ✓      | RST SM 0603 100K PM5 COL     |
| 3908 | ✓      | ✓       | ✓      | RST SM 0603 RC21 120K PM5 R  |
| 3910 | ✓      | ✓       | ✓      | RST SM 0603 33R PM5 COL      |
| 3917 | ✓      | ✓       | ✓      | RST SM 0603 1K PM5 COL       |
| 3918 | ✓      | ✓       | ✓      | RST SM 0603 1K PM5 COL       |
| 4902 | ✓      | ✓       | ✓      | RST SM 0603 JUMP. 0R05 COL   |
| 4903 | ✓      | ✓       | ✓      | RST SM 0603 JUMP. 0R05 COL   |
| 7901 | ✓      | ✓       | ✓      | IC SM TS482ID (ST00) R       |
| 7911 | ✓      | ✓       | ✓      | TRA SIG SM BC847BW (COL) R   |
| 7912 | ✓      | ✓       | ✓      | TRA SIG SM BC847BW (COL) R   |

7901-1 F4  
7901-1 A4  
7901-2 B4  
7902 D3  
7911 C5  
7912 D5  
7913 D5  
7914 E5  
7915 E5  
7916 F5  
7917 E3  
7919 E2  
7922 F6  
F901 B3  
F902 B6  
F903 C6  
F904 C3  
F905 D2  
F908 A2  
F910 B2  
I901 A3  
I902 B5  
I903 C5  
I904 B6  
I905 C5  
I911 D2  
I912 D3  
I913 E2  
I914 E1

SSB: Audio

B07 AUDIO

B07

| *    | LCD | PDP |
|------|-----|-----|
| 3A03 | 10K | 6K8 |
| 3A04 | 12K | 22K |
| 3A06 | 10K | 6K8 |
| 3A07 | 10K | 6K8 |
| 3A08 | 12K | 22K |
| 3A11 | 10K | 6K8 |

CLASS D POWER AMPLIFIER

TO SPEAKERS

DC-DETECTION

- 1735 D11  
2A01 B7  
2A02 B9  
2A04 C7  
2A08 B9  
2A09 D5  
2A10 D5  
2A11 D3  
2A12 D4  
2A13 D8  
2A14 D8  
2A15 D3  
2A16 D3  
2A17 D8  
2A18 D6  
2A19 D4  
2A20 E3  
2A21 D7  
2A22 E3  
2A23 E8  
2A24 E3  
2A25 E6  
2A26 E8  
2A27 E6  
2A28 E8  
2A29 E3  
2A30 F6  
2A31 F7  
2A32 F4  
2A33 F5  
2A34 F5  
2A35 E7  
2A36 F7  
2A37 D8  
2A38 E8  
2A40 F3  
2A41 F9  
2A45 E7  
2A46 A6  
2A47 B6  
3A01 B6  
3A02 B8  
3A03 D2  
3A04 D3  
3A05 D9  
3A06 D2  
3A07 D2  
3A08 D3  
3A09 D7  
3A11 E2  
3A12 E6  
3A13 E3  
3A14 E9  
3A15 E6  
3A17 E7  
3A19 F3  
3A26 E3  
3A27 F9  
3A28 F9  
3A29 E10  
3A30 E10  
3A31 F11  
4A01 A6  
4A02 A6  
5A03 C7  
5A04 E7  
5A05 B6  
5A06 B8  
5A07 A6  
7A01 D4  
7A05 E11  
7A06 F10  
7A07 F10  
FA01 C6  
FA02 B8  
FA04 D6  
FA05 D2  
FA06 D2  
FA07 D11  
FA08 D11  
FA09 E2  
FA10 D11  
FA11 D11  
FA12 E2  
FA32 E11  
IA01 D3  
IA02 D3  
IA03 D6  
IA04 D9  
IA05 D3  
IA06 D4  
IA07 D6  
IA09 D4  
IA10 D3  
IA11 E3  
IA12 E3  
IA13 E4  
IA14 E6  
IA15 E4  
IA16 E6  
IA17 E9  
IA18 E5  
IA19 E4  
IA20 E6  
IA21 F4  
IA22 F4  
IA23 D6  
IA24 B7  
IA25 B9  
IA26 B7  
IA27 B9  
IA29 F10  
IA30 E10  
IA31 E10  
IA33 E4  
IA34 C8  
IA35 D7  
IA36 D7  
IA37 E8  
IA38 E7  
IA39 F7  
IA40 A7  
IA41 A6

## SSB: SRP List

## 1.1. Introduction

SRP (Service Reference Protocol) is a software tool that creates a list with all references to signal lines. The list contains references to the signals within all schematics of a PWB. It replaces the text references currently printed next to the signal names in the schematics. These printed references are created manually and are therefore not guaranteed to be 100% correct. In addition, in the current crowded schematics there is often none or very little place for these references. Some of the PWB schematics will use SRP while others will still use the manual references. Either there will be an SRP reference list for a schematic, or there will be printed references in the schematic.

## 1.2. Non-SRP Schematics

There are several different signals available in a schematic:

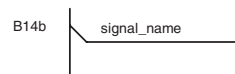
## 1.2.1. Power Supply Lines

All power supply lines are available in the supply line overview (see chapter 6). In the schematics (see chapter 7) is not indicated where supplies are coming from or going to. It is however indicated if a supply is incoming (created elsewhere), or outgoing (created or adapted in the current schematic).



## 1.2.2. Normal Signals

For normal signals, a schematic reference (e.g. B14b) is placed next to the signals.

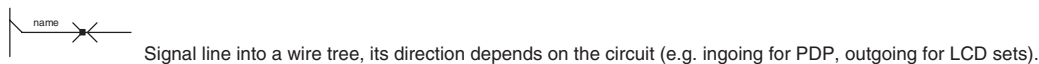
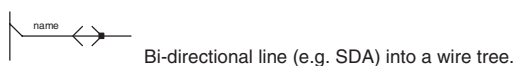
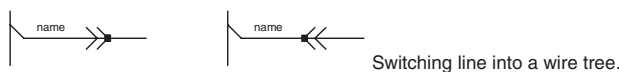
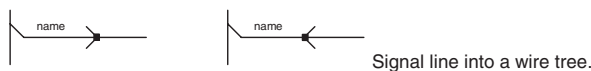
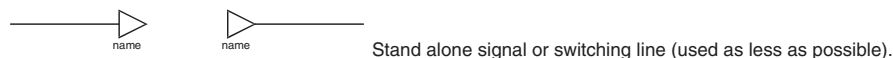


## 1.2.3. Grounds

For normal and special grounds (e.g. GNDHOT or GND3V3 etc.), nothing is indicated.

## 1.3. SRP Schematics

SRP is a tool, which automatically creates a list with signal references, indicating on which schematic the signals are used. A reference is created for all signals indicated with an SRP symbol, these symbols are:



## Remarks:

- When there is a black dot on the "signal direction arrow" it is an SRP symbol, so there will be a reference to the signal name in the SRP list.
- All references to normal grounds (Ground symbols without additional text) are not listed in the reference list, this to keep it concise.
- Signals that are not used in multiple schematics, but only once or several times in the same schematic, are included in the SRP reference list, but only with one reference.

## Additional Tip:

When using the PDF service manual file, you can very easily search for signal names and follow the signal over all the schematics. In Adobe PDF reader:

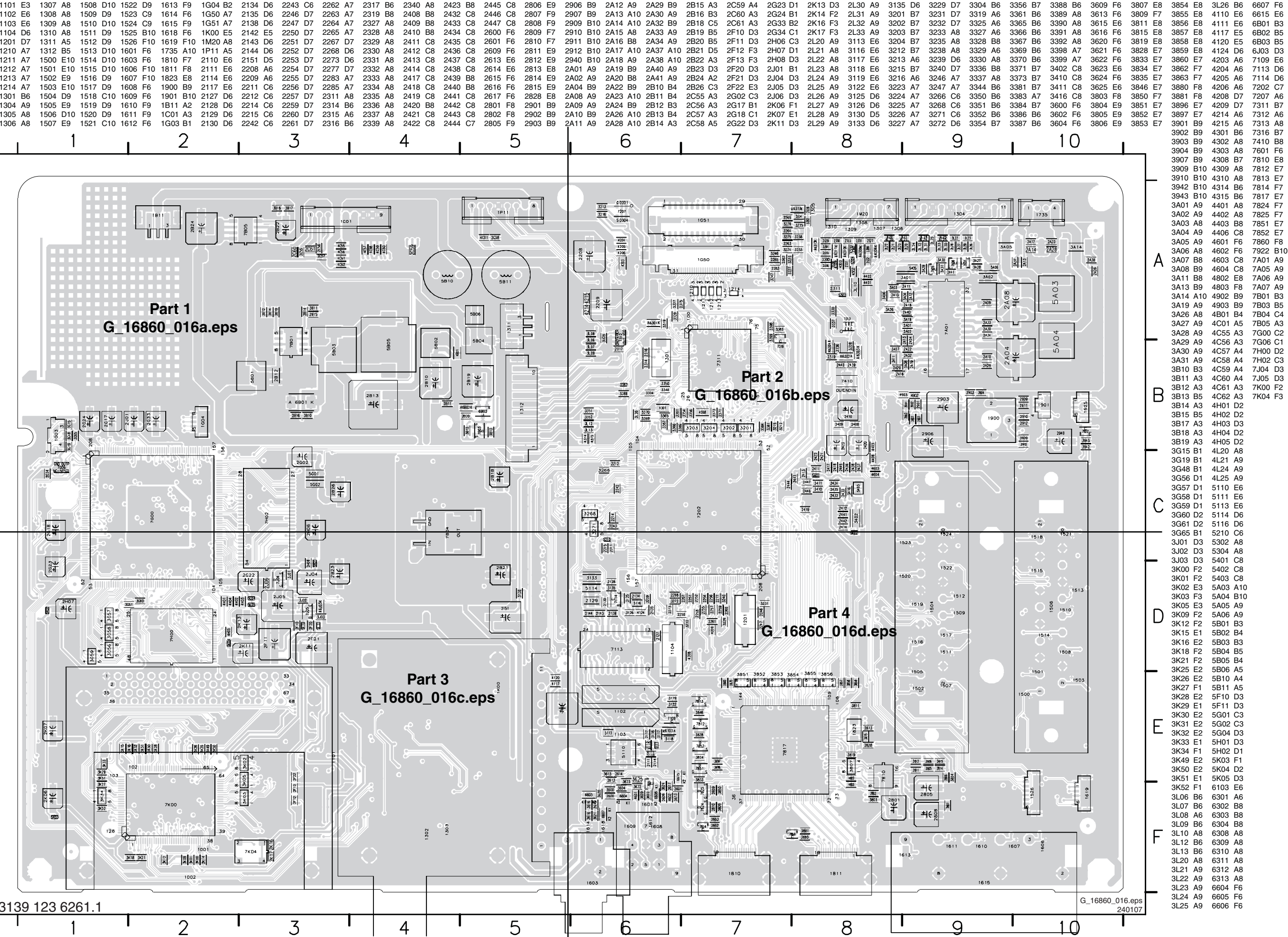
- Select the signal name you want to search for, with the "Select text" tool.
- Copy and paste the signal name in the "Search PDF" tool.
- Search for all occurrences of the signal name.
- Now you can quickly jump between the different occurrences and follow the signal over all schematics. It is advised to "zoom in" to e.g. 150% to see clearly, which text is selected. Then you can zoom out, to get an overview of the complete schematic.

PS. It is recommended to use at least Adobe PDF (reader) version 6.x, due to better search possibilities in this version.

| Netname      | Schematic  | ALE_EMU         | B04A (1x) | HDMI_Y(0)       | B04B (1x) | MIU_ADDR(22)     | B03C (1x) | SC1_AUDIO_MUTE_R | B06B (1x) | SIF            | B04C (1x) |
|--------------|------------|-----------------|-----------|-----------------|-----------|------------------|-----------|------------------|-----------|----------------|-----------|
| +12V_DISP    | B02 (1x)   | ALE_EMU         | B04B (1x) | HDMI_Y(0)       | B06C (1x) | MIU_ADDR(22)     | B03D (1x) | SC1_AUDIO_MUTE_R | B06D (1x) | SIF1           | B03A (2x) |
| +12V_DISP    | B04A (1x)  | ANTI_PLOP       | B04A (1x) | HDMI_Y(0-7)     | B04B (1x) | MIU_ADDR(22)     | B03E (1x) | SC1_AUDIO_OUT_L  | B04C (1x) | SIF2           | B03A (2x) |
| +12V_DISP    | B04B (1x)  | ANTI_PLOP       | B06D (1x) | HDMI_Y(0-7)     | B06C (1x) | MIU_ADDR(23)     | B03C (1x) | SC1_AUDIO_OUT_L  | B06B (2x) | STANDBY        | B02 (2x)  |
| +1V2_MOJO    | B02 (1x)   | AUDIO_LS_L      | B04C (1x) | HDMI_Y(1)       | B04B (1x) | MIU_ADDR(23)     | B03D (1x) | SC1_AUDIO_OUT_R  | B04C (1x) | STANDBYn       | B04A (1x) |
| +1V2_MOJO    | B03D (2x)  | AUDIO_LS_L      | B07 (1x)  | HDMI_Y(1)       | B06C (1x) | MIU_ADDR(24)     | B03C (1x) | SC1_AUDIO_OUT_R  | B06B (2x) | STANDBYn       | B04A (1x) |
| +1V8_SW      | B02 (1x)   | AUDIO_LS_R      | B04C (1x) | HDMI_Y(2)       | B04B (1x) | MIU_ADDR(24)     | B03D (1x) | SC1_B_IN         | B04B (1x) | STANDBYn       | B04B (1x) |
| +1V8_SW      | B03B (2x)  | AUDIO_LS_R      | B07 (1x)  | HDMI_Y(2)       | B06C (1x) | MIU_ADDR(3)      | B03C (1x) | SC1_B_IN         | B06B (2x) | STANDBYn       | B04B (1x) |
| +1V8_SW      | B03F (1x)  | -AUDIO_POWER    | B02 (1x)  | HDMI_Y(3)       | B04B (1x) | MIU_ADDR(3)      | B03D (1x) | SC1_CVBS_IN      | B04B (1x) | STANDBYn       | B07 (1x)  |
| +1V8_SW      | B04B (3x)  | -AUDIO_POWER    | B07 (1x)  | HDMI_Y(3)       | B06C (1x) | MIU_ADDR(3)      | B03E (1x) | SC1_CVBS_IN      | B06B (1x) | STV_CS         | B03C (1x) |
| +1V8_SW      | B06C (3x)  | BACKLIGHT_BOOST | B02 (1x)  | HDMI_Y(4)       | B04B (1x) | MIU_ADDR(4)      | B03C (1x) | SC1_CVBS_RF_OUT  | B04A (1x) | STV_A25        | B03D (1x) |
| +3V3         | B03B (3x)  | BACKLIGHT_BOOST | B04A (1x) | HDMI_Y(4)       | B06C (1x) | MIU_ADDR(4)      | B03D (1x) | SC1_CVBS_RF_OUT  | B06B (1x) | STV_CS         | B03C (1x) |
| +3V3         | B03D (3x)  | BL_ADJUST       | B02 (1x)  | HDMI_Y(5)       | B06C (1x) | MIU_ADDR(5)      | B03C (1x) | SC1_FBL_IN       | B04B (1x) | STV_CS         | B03D (1x) |
| +3V3         | B03E (2x)  | BL_ADJUST       | B04A (1x) | HDMI_Y(5)       | B06C (1x) | MIU_ADDR(5)      | B03D (1x) | SC1_FBL_IN       | B06B (2x) | STV_INT        | B03C (1x) |
| +3V3         | B03F (1x)  | BL_ON_OFF       | B04B (1x) | HDMI_Y(6)       | B04B (1x) | MIU_ADDR(5)      | B03E (1x) | SC1_G_IN         | B04B (1x) | STV_INT        | B03D (1x) |
| +3V3         | B03F (1x)  | BL_ON_OFF       | B02 (1x)  | HDMI_Y(6)       | B06C (1x) | MIU_ADDR(5)      | B03E (1x) | SC1_G_IN         | B06B (2x) | STV_TDO        | B03B (1x) |
| +3V3         | B03F (1x)  | BL_ON_OFF       | B04A (1x) | HDMI_Y(7)       | B04B (1x) | MIU_ADDR(6)      | B03C (1x) | SC1_R_IN         | B04B (1x) | STV_TDO        | B03C (1x) |
| +3V3_BUF     | B03C (4x)  | BOLT_ON_SCL     | B04A (2x) | HDMI_Y(7)       | B06C (1x) | MIU_ADDR(6)      | B03D (1x) | SC1_R_IN         | B06B (2x) | TDA_CLK        | B03B (1x) |
| +3V3_CORE    | B03C (2x)  | BOLT_ON_SDA     | B04A (2x) | HP_AUDIO_OUT_L  | B04C (1x) | MIU_ADDR(6)      | B03E (1x) | SC1_RF_OUT_CVBS  | B04B (1x) | TDA_CLK        | B03C (1x) |
| +3V3_MOJO    | B02 (1x)   | CE              | B04A (1x) | HP_AUDIO_OUT_R  | B06D (1x) | MIU_ADDR(7)      | B03C (1x) | SC1_RF_OUT_CVBS  | B06B (1x) | TDA_DAT(0)     | B03B (1x) |
| +3V3_MOJO    | B03F (2x)  | COMP_AUDIO_IN_L | B04C (1x) | HP_AUDIO_OUT_R  | B04C (1x) | MIU_ADDR(7)      | B03D (1x) | SC1_STATUS       | B04A (1x) | TDA_DAT(0)     | B03C (1x) |
| +3V3_NORM48  | B03C (4x)  | COMP_AUDIO_IN_L | B06A (1x) | HP_AUDIO_OUT_R  | B06D (1x) | MIU_ADDR(7)      | B03E (1x) | SC1_STATUS       | B06B (1x) | TDA_DAT(0.7)   | B03B (1x) |
| +3V3_STBY    | B02 (1x)   | COMP_AUDIO_IN_R | B04C (1x) | I2C_LOCAL_SCL   | B03B (1x) | MIU_ADDR(8)      | B03C (1x) | SC2_AUDIO_IN_L   | B04C (1x) | TDA_DAT(1)     | B03B (1x) |
| +3V3_STBY    | B04A (30x) | COMP_AUDIO_IN_R | B06A (1x) | I2C_LOCAL_SCL   | B03C (1x) | MIU_ADDR(8)      | B03D (1x) | SC2_AUDIO_IN_L   | B06B (2x) | TDA_DAT(1)     | B03C (1x) |
| +3V3_STBY    | B06D (3x)  | CPU_RST         | B04A (1x) | I2C_LOCAL_SCL   | B03D (1x) | MIU_ADDR(8)      | B03E (1x) | SC2_AUDIO_IN_R   | B04C (1x) | TDA_DAT(2)     | B03B (1x) |
| +3V3_STBY    | B03C (10x) | CS              | B04A (1x) | I2C_LOCAL_SCL   | B03E (1x) | MIU_ADDR(9)      | B03C (1x) | SC2_AUDIO_IN_R   | B06B (2x) | TDA_DAT(2)     | B03C (1x) |
| +3V3_SW      | B02 (1x)   | CTRL_DISP1      | B04B (8x) | I2C_LOCAL_SDA   | B03C (1x) | MIU_ADDR(9)      | B03D (1x) | SC2_AUDIO_MUTE_L | B06B (1x) | TDA_DAT(3)     | B03C (1x) |
| +3V3_SW      | B04B (8x)  | CTRL_DISP1_up   | B04B (2x) | I2C_LOCAL_SDA   | B03C (1x) | MIU_DATA(0)      | B03C (1x) | SC2_AUDIO_MUTE_R | B06B (1x) | TDA_DAT(4)     | B03B (1x) |
| +3V3_SW      | B04B (13x) | CTRL_DISP1_up   | B04B (1x) | I2C_LOCAL_SDA   | B03E (1x) | MIU_DATA(0)      | B03D (1x) | SC2_AUDIO_MUTE_R | B06D (1x) | TDA_DAT(4)     | B03C (1x) |
| +3V3_SW      | B06C (19x) | CTRL_DISP2      | B04B (2x) | I2C_TDA_SCL     | B03A (1x) | MIU_DATA(0)      | B03E (1x) | SC2_AUDIO_OUT_L  | B04C (1x) | TDA_DAT(5)     | B03B (1x) |
| +3V3_VDDP    | B03D (3x)  | CTRL_DISP2      | B04B (2x) | I2C_TDA_SCL     | B03B (1x) | MIU_DATA(0:15)   | B03D (1x) | SC2_AUDIO_OUT_L  | B06B (1x) | TDA_DAT(5)     | B03C (1x) |
| +3V3clean    | B03D (1x)  | CTRL_DISP3      | B04B (2x) | I2C_TDA_SDA     | B03A (1x) | MIU_DATA(1)      | B03E (1x) | SC2_AUDIO_OUT_R  | B06B (1x) | TDA_DAT(6)     | B03B (1x) |
| +3V3clean    | B03F (1x)  | CTRL_DISP4      | B04B (2x) | I2C_TDA_SDA     | B03B (1x) | MIU_DATA(1)      | B03E (1x) | SC2_AUDIO_OUT_R  | B06B (1x) | TDA_DAT(6)     | B03C (1x) |
| +3V3FE       | B03B (6x)  | CTRL_DISP4_up   | B04B (1x) | IBO_B_IN        | B03F (1x) | MIU_DATA(1)      | B03D (1x) | SC2_C_IN         | B04B (1x) | TDA_DAT(7)     | B03B (1x) |
| +5V_AUD      | B04C (3x)  | CVBS_RF         | B03A (1x) | IBO_B_IN        | B03F (1x) | MIU_DATA(1)      | B03E (1x) | SC2_C_IN         | B06B (2x) | TDA_DAT(7)     | B03C (1x) |
| +5V_D        | B04C (4x)  | CVBS_RF         | B04B (1x) | IBO_CVBS_IN     | B03E (1x) | MIU_DATA(10)     | B03D (1x) | SC2_CVBS_MON_OUT | B04B (1x) | TDA_SYNC       | B03B (1x) |
| +5V_IF       | B03A (4x)  | CX_AVDD_ADC1    | B04B (2x) | IBO_CVBS_IN     | B03E (1x) | MIU_DATA(10)     | B03E (1x) | SC2_CVBS_MON_OUT | B06B (1x) | TDA_SYNC       | B03C (1x) |
| +5V_STANDBY  | B02 (4x)   | CX_AVDD_ADC2    | B04B (2x) | IBO_G_IN        | B03F (1x) | MIU_DATA(11)     | B03D (1x) | SC2_CVBS_MON_OUT | B06D (1x) | TDA_VALID      | B03B (1x) |
| +5V_STANDBY  | B04A (4x)  | CX_AVDD_ADC3    | B04B (2x) | IBO_G_IN        | B04B (1x) | MIU_DATA(11)     | B03E (1x) | SC2_STATUS       | B04A (1x) | TDA_VALID      | B03C (1x) |
| +5V_STANDBY  | B04B (2x)  | CX_AVDD_ADC4    | B04B (2x) | IBO_IRQ         | B03D (1x) | MIU_DATA(12)     | B03D (1x) | SC2_STATUS       | B06B (1x) | TS_CLK         | B03C (1x) |
| +5V_SW       | B02 (6x)   | CX_AVDD3_ADC1   | B04B (2x) | IBO_IRQ         | B04B (1x) | MIU_DATA(12)     | B03E (1x) | SC2_Y_CVBS_IN    | B04B (1x) | TS_CLK         | B03D (1x) |
| +5V_SW       | B03A (3x)  | CX_AVDD3_ADC2   | B04B (2x) | IBO_R_IN        | B03F (1x) | MIU_DATA(13)     | B03D (1x) | SC2_Y_CVBS_IN    | B06B (2x) | TS_DATA(0)     | B03C (1x) |
| +5V_SW       | B03B (9x)  | CX_AVDD3_BG_ASS | B04B (2x) | IBO_R_IN        | B04B (1x) | MIU_DATA(13)     | B03E (1x) | SDRAM_ADDR(0)    | B03D (1x) | TS_DATA(0)     | B03D (1x) |
| +5V_SW       | B03C (2x)  | CX_AVDD3_OUTBUF | B04B (2x) | IF_AGC_IBO      | B03A (1x) | MIU_DATA(14)     | B03D (1x) | SDRAM_ADDR(0)    | B03E (1x) | TS_DATA(0.7)   | B03D (1x) |
| +5V_SW       | B03E (3x)  | CX_PAVDD        | B04B (2x) | IF_AGC_IBO      | B03B (1x) | MIU_DATA(14)     | B03E (1x) | SDRAM_ADDR(0:14) | B03D (1x) | TS_DATA(1)     | B03C (1x) |
| +5V_SW       | B04A (1x)  | CX_PAVDD1       | B04B (2x) | IF_ATV          | B03A (2x) | MIU_DATA(15)     | B03D (1x) | SDRAM_ADDR(1)    | B03D (1x) | TS_DATA(1)     | B03D (1x) |
| +5V_SW       | B04B (2x)  | CX_PAVDD2       | B04B (2x) | IC_SDA          | B03A (2x) | MIU_DATA(15)     | B03E (1x) | SDRAM_ADDR(1)    | B03E (1x) | TS_DATA(2)     | B03C (1x) |
| +5V_SW       | B04C (2x)  | CX_PVDVDD       | B04B (2x) | IC_SCL          | B03D (1x) | MIU_DATA(2)      | B03C (1x) | SDRAM_ADDR(10)   | B03D (1x) | TS_DATA(2)     | B03D (1x) |
| +5V_SW       | B06A (2x)  | DC_PROT         | B04A (1x) | IC_SCL          | B04A (1x) | MIU_DATA(2)      | B03D (1x) | SDRAM_ADDR(10)   | B03E (1x) | TS_DATA(3)     | B03C (1x) |
| +5V_SW       | B06B (2x)  | DC_PROT         | B07 (1x)  | IC_SCL          | B04B (2x) | MIU_DATA(2)      | B03E (1x) | SDRAM_ADDR(11)   | B03D (1x) | TS_DATA(3)     | B03D (1x) |
| +5V_SW       | B06D (1x)  | DDC_RESET       | B04A (1x) | IC_SCL          | B04C (1x) | MIU_DATA(3)      | B03C (1x) | SDRAM_ADDR(11)   | B03E (1x) | TS_DATA(4)     | B03C (1x) |
| +5VHDMILA    | B06C (3x)  | DDC_RESET       | B06C (2x) | IC_SCL          | B06C (1x) | MIU_DATA(3)      | B03D (1x) | SDRAM_ADDR(12)   | B03D (1x) | TS_DATA(4)     | B03D (1x) |
| +5VHDMILB    | B03A (3x)  | DVB_SW          | B03A (1x) | IC_SCL_up       | B04A (2x) | MIU_DATA(3)      | B03E (1x) | SDRAM_ADDR(12)   | B03E (1x) | TS_DATA(5)     | B03C (1x) |
| +8V          | B04C (2x)  | DVB_SW          | B04B (2x) | IC_SDA          | B03D (1x) | MIU_DATA(4)      | B03D (1x) | SDRAM_ADDR(13)   | B03D (1x) | TS_DATA(5)     | B03D (1x) |
| +AUDIO_POWER | B02 (1x)   | E_PAGE          | B04A (1x) | IC_SDA          | B03D (1x) | MIU_DATA(4)      | B03E (1x) | SDRAM_ADDR(13)   | B03E (1x) | TS_DATA(6)     | B03C (1x) |
| +AUDIO_POWER | B04C (1x)  | ENGAGE          | B06D (1x) | IC_SDA          | B04A (1x) | MIU_DATA(4)      | B03E (1x) | SDRAM_ADDR(14)   | B03D (1x) | TS_DATA(6)     | B03D (1x) |
| +AUDIO_POWER | B06A (1x)  | ENGAGE          | B07 (1x)  | IC_SDA          | B04B (2x) | MIU_DATA(5)      | B03C (1x) | SDRAM_ADDR(14)   | B03E (1x) | TS_DATA(7)     | B03C (1x) |
| +AUDIO_POWER | B06B (7x)  | FE_LOCK         | B03B (1x) | IC_SDA          | B04C (1x) | MIU_DATA(5)      | B03D (1x) | SDRAM_ADDR(2)    | B03D (1x) | TS_DATA(7)     | B03D (1x) |
| +IO_POWER    | B06A (10x) | FE_LOCK         | B03D (1x) | IC_SDA          | B06C (1x) | MIU_DATA(5)      | B03E (1x) | SDRAM_ADDR(2)    | B03E (1x) | TS_SYNC        | B03C (1x) |
| +IO_POWER    | B06B (7x)  | FRONT_C_IN      | B04B (1x) | IC_SDA_up       | B04A (2x) | MIU_DATA(6)      | B03C (1x) | SDRAM_ADDR(3)    | B03D (1x) | TS_SYNC        | B03D (1x) |
| +VTUN        | B02 (1x)   | FRONT_C_IN      | B06A (1x) | INT             | B04B (1x) | MIU_DATA(6)      | B03E (1x) | SDRAM_ADDR(3)    | B03E (1x) | TS_VALID       | B03D (1x) |
| +VTUN        | B04A (1x)  | FRONT_Y_CVBS_IN | B04B (1x) | INT             | B04B (1x) | MIU_DATA(6)      | B03E (1x) | SDRAM_ADDR(4)    | B03D (1x) | TS_VALID       | B03D (1x) |
| 10046_TDO    | B03B (1x)  | FRONT_Y_CVBS_IN | B06A (1x) | ISP             | B04A (1x) | MIU_DATA(7)      | B03C (1x) | SDRAM_ADDR(4)    | B03E (1x) | TXAn           | B04B (2x) |
| 10046_TDO    | B03D (1x)  | GNDDC           | B02 (1x)  | ITV_SPI_CLK     | B04A (2x) | MIU_DATA(7)      | B03D (1x) | SDRAM_ADDR(5)    | B03D (1x) | TXAp           | B04B (2x) |
| 4MHz_CLK     | B03A (1x)  | GNDSND          | B02 (3x)  | ITV_SPI_DATA_IN | B04B (2x) | MIU_DATA(7)      | B03E (1x) | SDRAM_ADDR(5)    | B03E (1x) | TXBn           | B04B (2x) |
| 4MHz_CLK     | B03B (1x)  | GNDSND          | B07 (21x) | JTAG_TCK        | B03B (1x) | MIU_DATA(8)      | B03D (1x) | SDRAM_ADDR(6)    | B03D (1x) | TXBp           | B04B (2x) |
| 4MHz_MOJO    | B03D (1x)  | GNDSND          | B02 (1x)  | JTAG_TCK        | B03C (1x) | MIU_DATA(8)      | B03E (1x) | SDRAM_ADDR(6)    | B03E (1x) | TXCLKn         | B04B (2x) |
| 4MHz_MOJO    | B04B (1x)  | GNDSND          | B04B (1x) | HD_PB_IN        | B03D (1x) | MIU_DATA(8)      | B03D (1x) | SDRAM_ADDR(6)    | B03D (1x) | TXCLKp         | B04B (2x) |
| 4MHz_MOJO    | B03B (1x)  | HD_PB_IN        | B06A (2x) | JTAG_TMS        | B03B (1x) | MIU_DATA(9)      | B03E (1x) | SDRAM_ADDR(7)    | B03E (1x) | TXCn           | B04B (2x) |
| A(0)         | B04A (1x)  | HD_PR_IN        | B04B (1x) | JTAG_TMS        | B03C (1x) | MIU_OEN          | B03C (1x) | SDRAM_ADDR(8)    | B03D (1x) | TXCp           | B04B (2x) |
| A(0)         | B04B (1x)  | HD_PR_IN        | B06A (2x) | JTAG_TMS        | B03D (1x) | MIU_OEN          | B03D (1x) | SDRAM_ADDR(8)    | B03E (1x) | TXD0           | B03D (1x) |
| A(0:7)       | B04A (1x)  | HD_Y_IN         | B04B (1x) | JTAG_TRST       | B03B (1x) | MIU_OEN          | B03E (1x) | SDRAM_ADDR(9)    | B03D (1x) | TXD0           | B03F (1x) |
| A(0:7)       | B04B (1x)  | HD_Y_IN         | B06A (2x) | JTAG_TRST       | B03C (1x) | MIU_OEN          | B03C (1x) | SDRAM_ADDR(9)    | B03E (1x) | TXDn           | B04B (2x) |
| A(1)         | B04A (2x)  | HDMI_AUDIO_IN_L | B04C (1x) | JTAG_TRST       | B03D (1x) | MIU_RDY          | B03D (1x) | SDRAM_CAS        | B03D (1x) | TXDp           | B04B (2x) |
| A(1)         | B04B (1x)  | HDMI_AUDIO_IN_L | B06C (1x) | KEYB            | B04A (2x) | MIU_WEN          | B03C (1x) | SDRAM_CAS        | B03E (1x) | user_EEPROM_WP | B03D (1x) |
| A(1:7)       | B04A (1x)  | HDMI_AUDIO_IN_R | B04C (1x) | LCD_PWR_ON      | B04A (1x) | MIU_WEN          | B03D (1x) | SDRAM_CKE        | B03D (1x) | user_EEPROM_WP | B03E (1x) |
| A(10)        | B04A (2x)  | HDMI_Cb(0)      | B06C (1x) | LCD_PWR_ON      | B04B (1x) | MIU_WEN          | B03E (1x) | SDRAM_CKE        | B03E (1x) | VCCEN          | B03C (1x) |
| A(11)        | B04A (2x)  | HDMI_Cb(1)      | B04B (1x) | LED1            | B04A (2x) | MOJO_I2S_OUT_SCK | B03D (1x) | SDRAM_CLK        | B03D (1x) | VDD            | B07 (3x)  |
| A(12)        | B04A (2x)  | HDMI_Cb(2)      | B04B (1x) | LED2            | B04B (2x) | MOJO_I2S_OUT_SCK | B03E (1x) | SDRAM_CLK        | B03E (1x) | VDDA           | B07 (2x)  |
| A(13)        | B04A (2x)  | HDMI_Cb(3)      | B04B (1x) | LIGHT_SENSOR    | B04A (2x) | MOJO_I2S_OUT_SD  | B03D (1x) | SDRAM_CLK        | B03D (1x) | VDISP          | B04B (2x) |
| A(14)        | B04A (2x)  | HDMI_Cb(4)      | B04B (1x) | MIU_ADDR(0)     | B06C (1x) | MOJO_I2S_OUT_SD  | B04C (1x) | SDRAM_DATA(0)    | B03E (1x) | VGA_H          | B04B (1x) |
| A(15)        | B04A (2x)  | HDMI_Cb(5)      | B04B (1x) | MIU_ADDR(1)     | B06C (1x) | MOJO_I2S_OUT_WS  | B03D (1x) | SDRAM_DATA(0:15) | B03D (1x) | VGA_V          | B04B (1x) |
| A(16)        | B04A (2x)  | HDMI_Cb(6)      | B04B (1x) | MIU_ADDR(2)     | B06C (1x) | MOJO_I2S_OUT_WS  | B04C (1x) | SDRAM_DATA(1)    | B03D (1x) | VGA_V          | B06A (1x) |
| A(17)        | B04A (2x)  | HDMI_Cb(7)      | B04B (1x) | MUTEN           | B03C (1x) | SDRAM_DATA(1)    | B03E (1x) | SDRAM_DATA(1)    | B03E (1x) | VIF1           | B03A (2x) |
| A(18)        | B04A (2x)  | HDMI_Cb(8)      | B04B (1x) | MUTEN           | B03D (1x) |                  |           |                  |           |                |           |



Layout Small Signal Board (Overview Top Side)



## 5





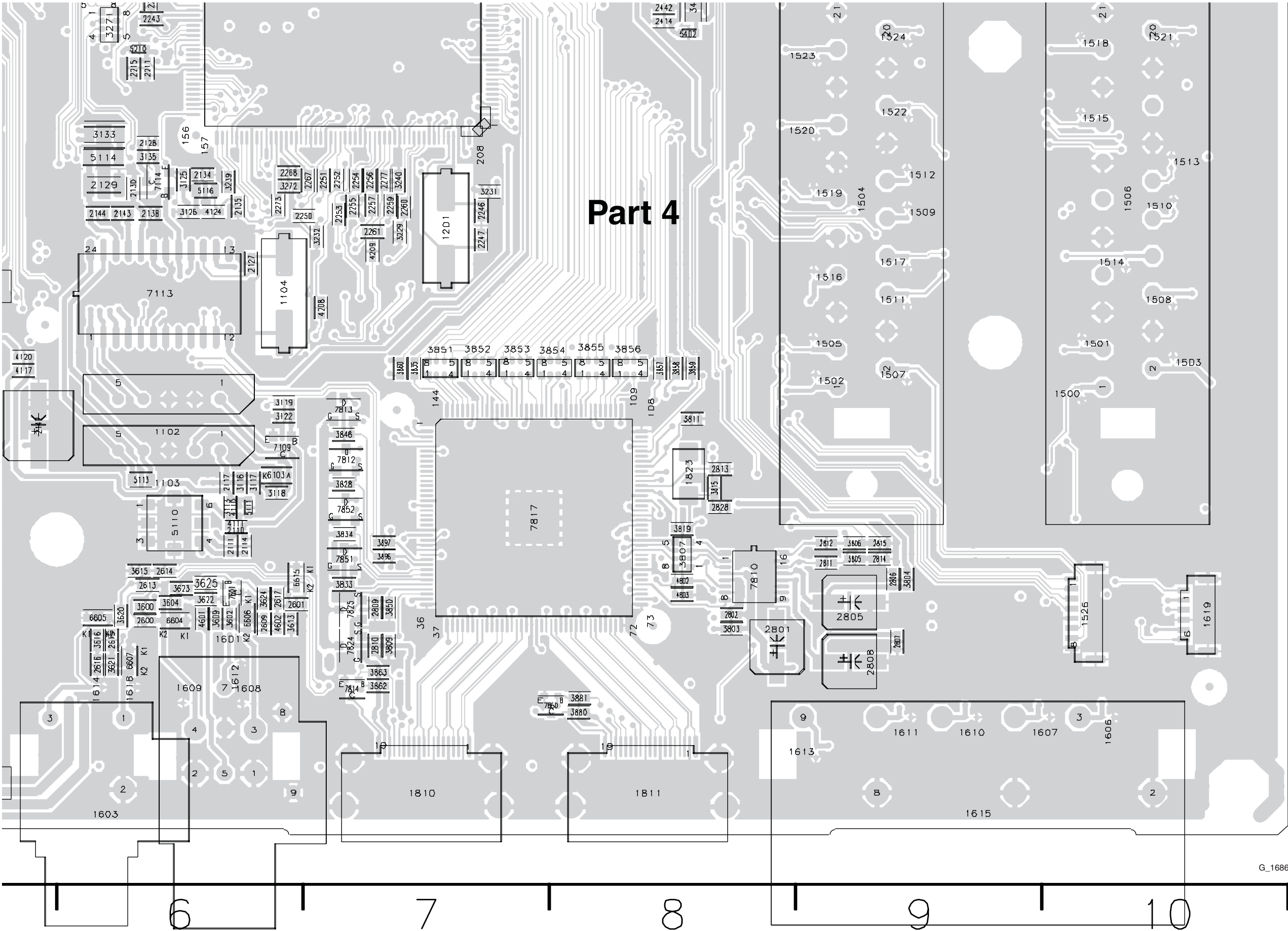
## 10



## F

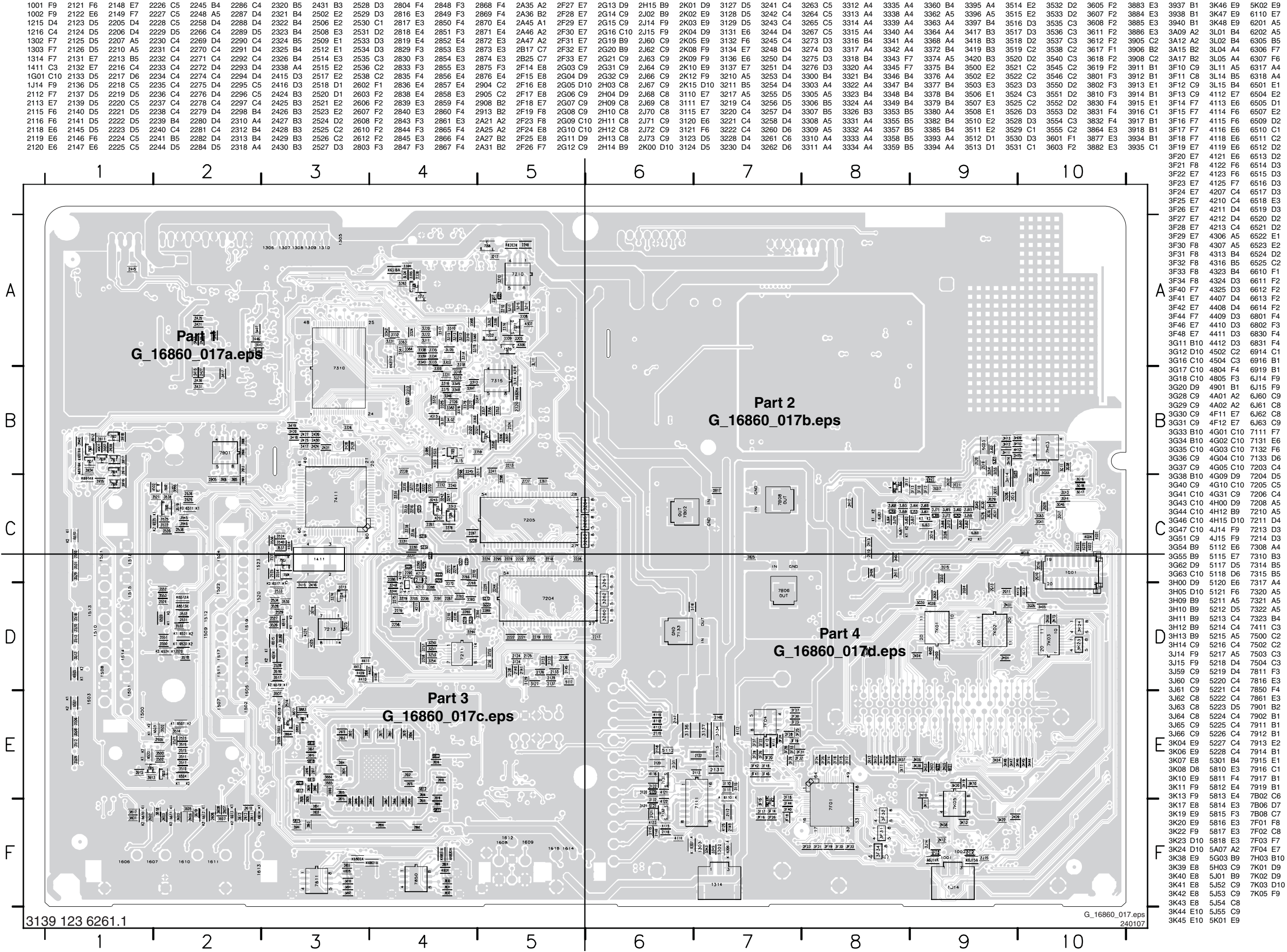


Layout Small Signal Board (Part 4 Top Side)

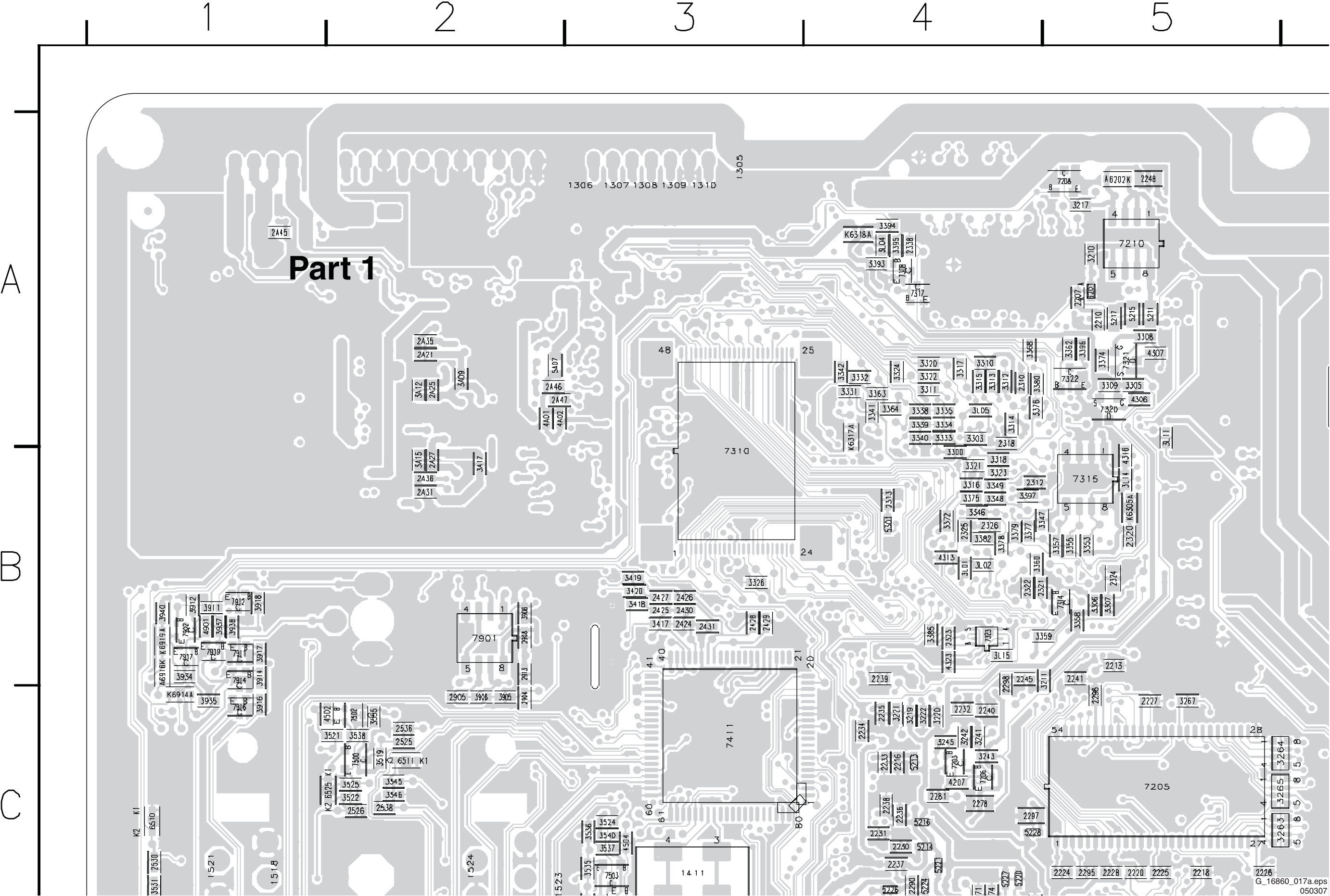




Layout Small Signal Board (Overview Bottom Side)

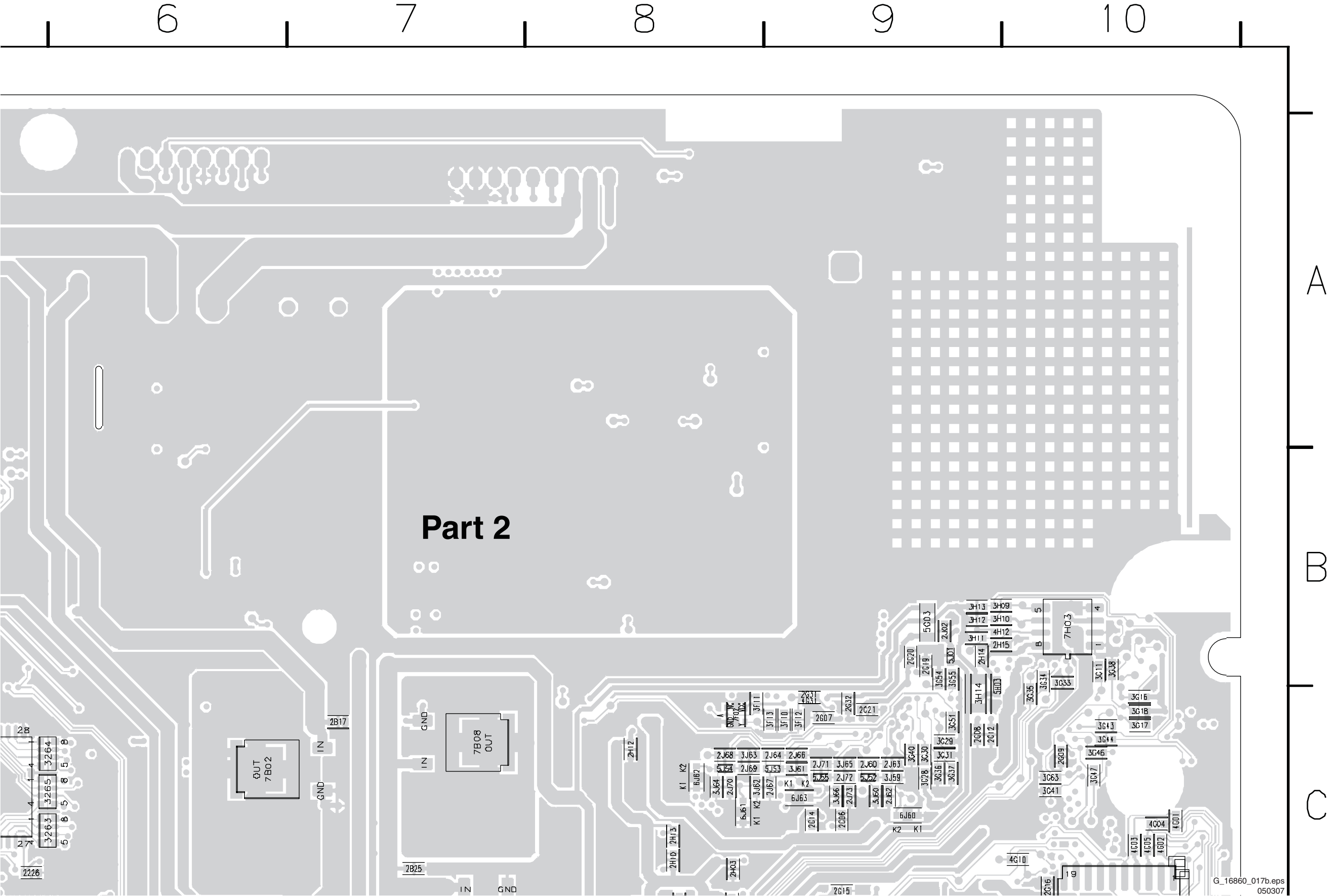


Layout Small Signal Board (Part 1 Bottom Side)

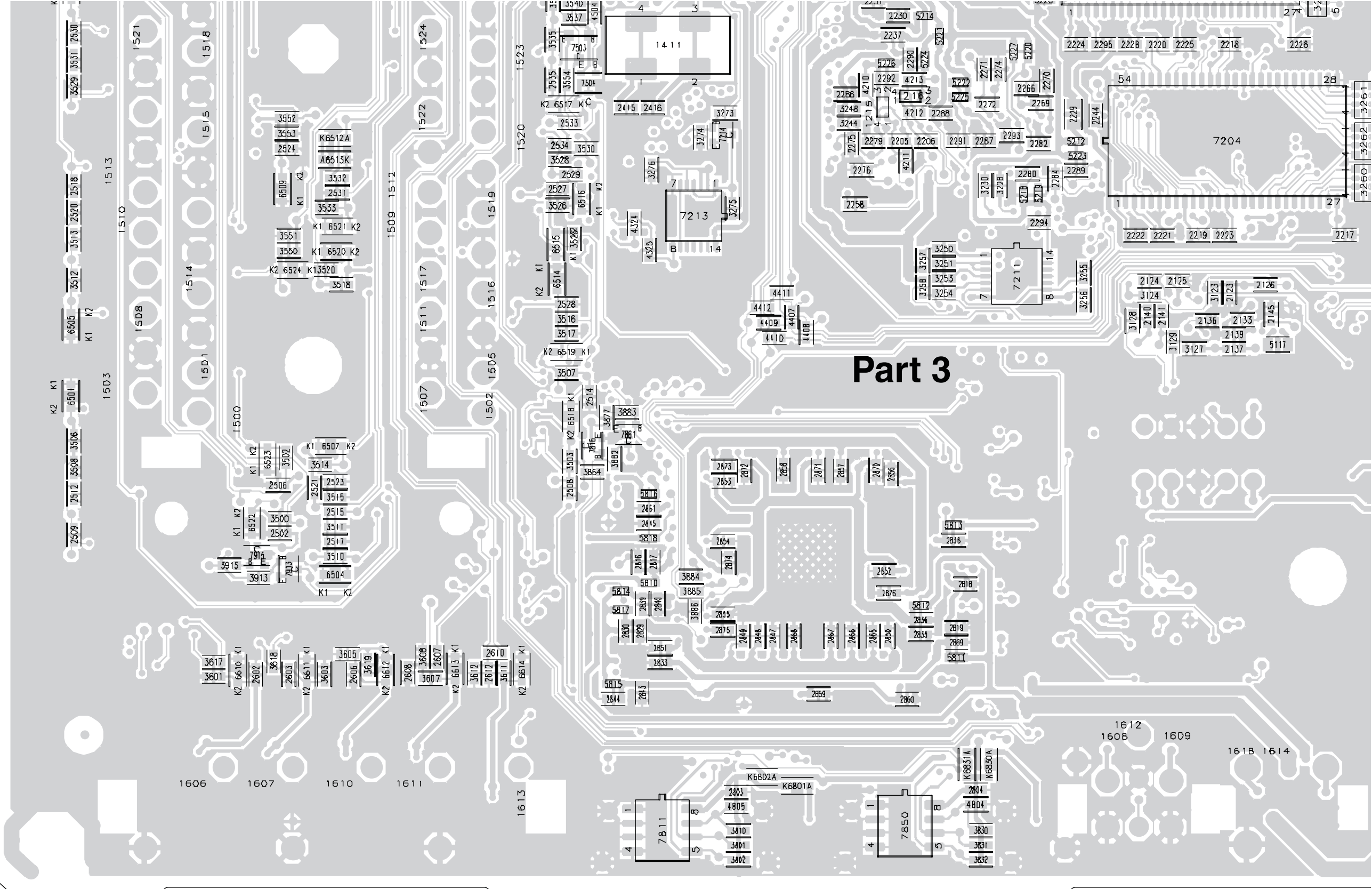




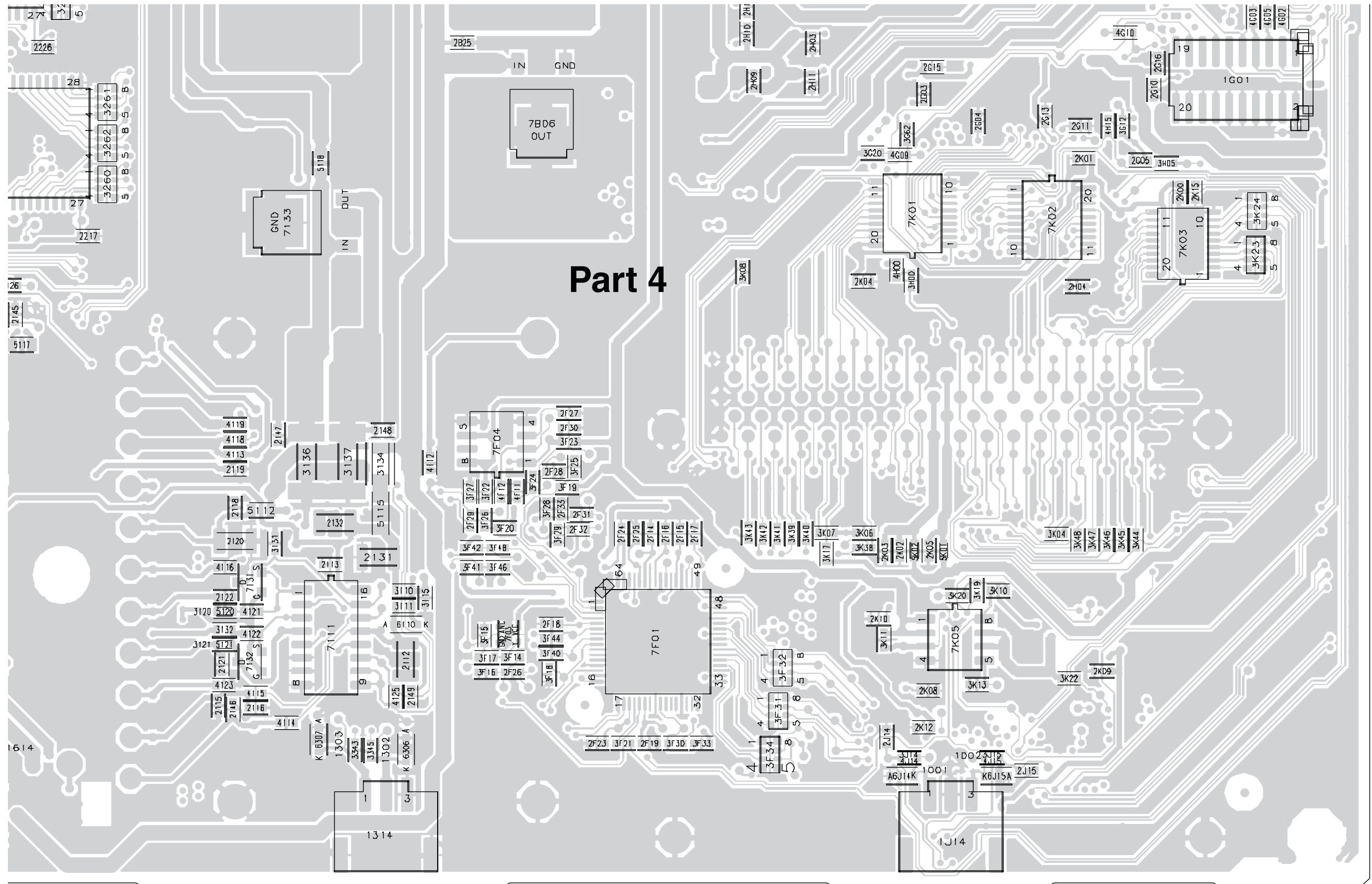
Layout Small Signal Board (Part 2 Bottom Side)



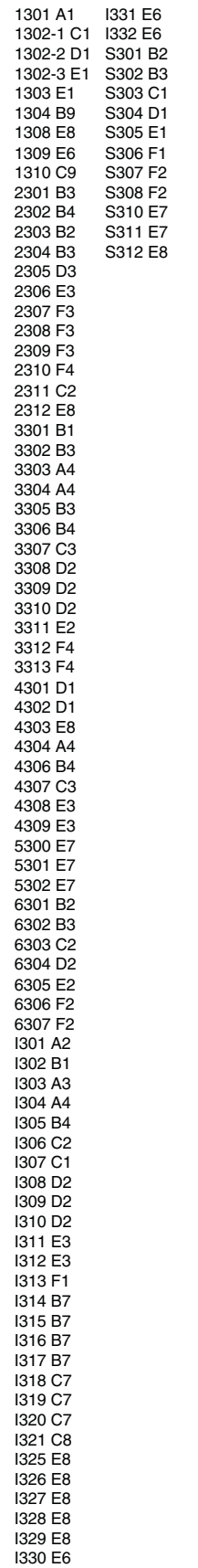
Layout Small Signal Board (Part 3 Bottom Side)



## Part 4



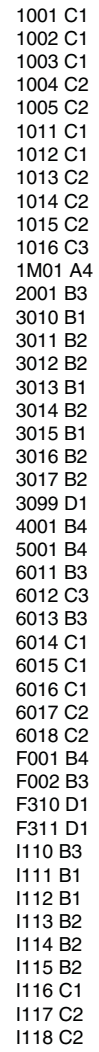
## D REAR FACING SIDE I/O







## KEYBOARD CONTROL

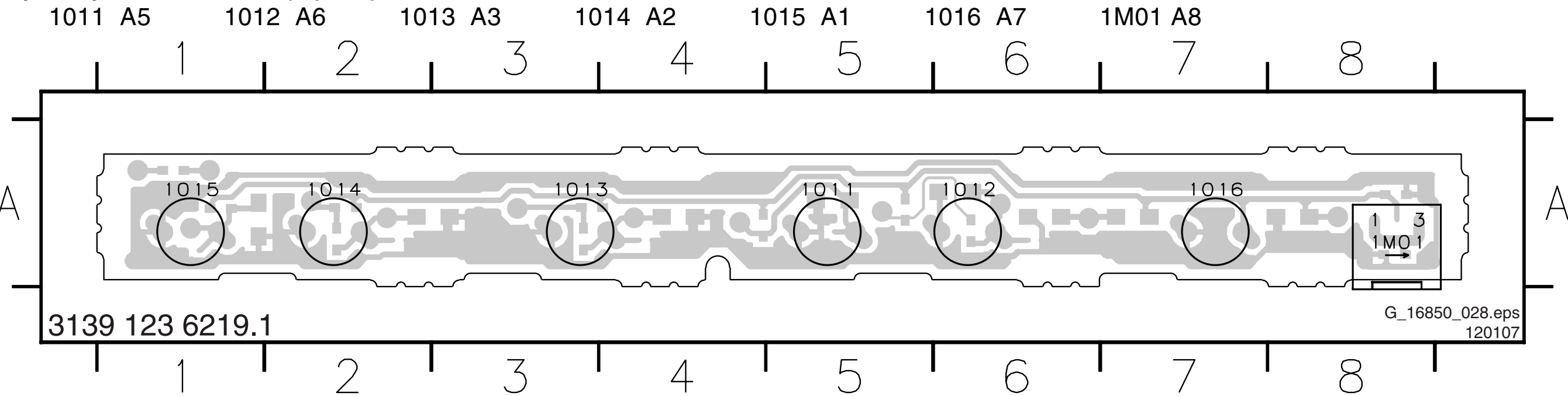


**Personal Notes:**

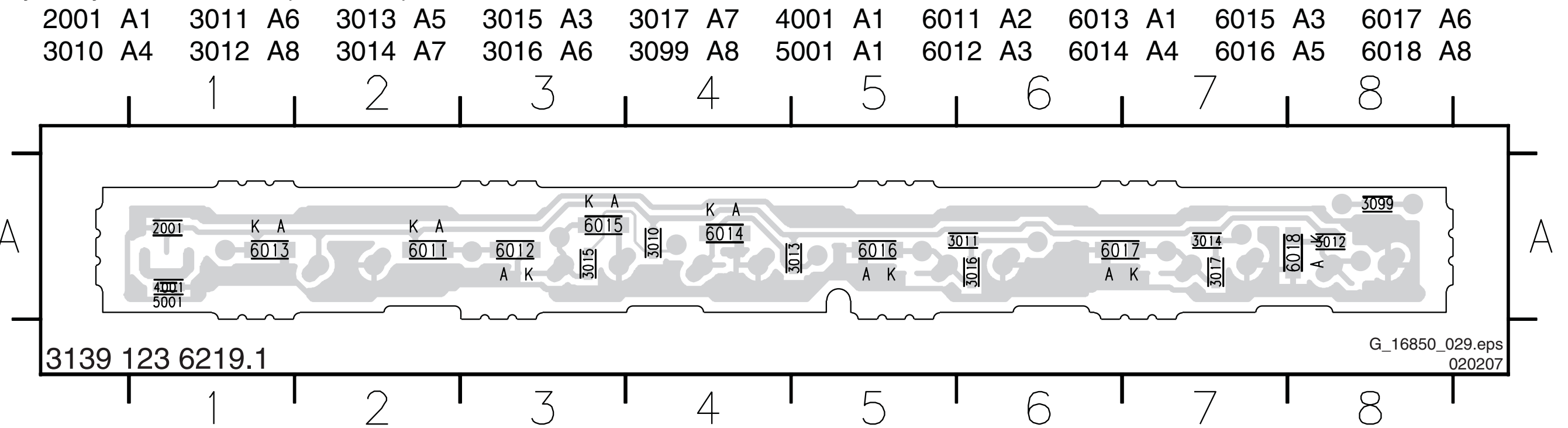
| ★    | LC06 | Jaguar |
|------|------|--------|
| 3010 | 390R | 390R   |
| 3011 | 560R | 560R   |
| 3012 | 1K8  | 1K8    |
| 3013 | 150R | 150R   |
| 3014 | 820R | 820R   |
| 6011 | YES  | NO     |
| 6012 | YES  | NO     |
| 6013 | NO   | YES    |

E\_06532\_012.eps  
131004

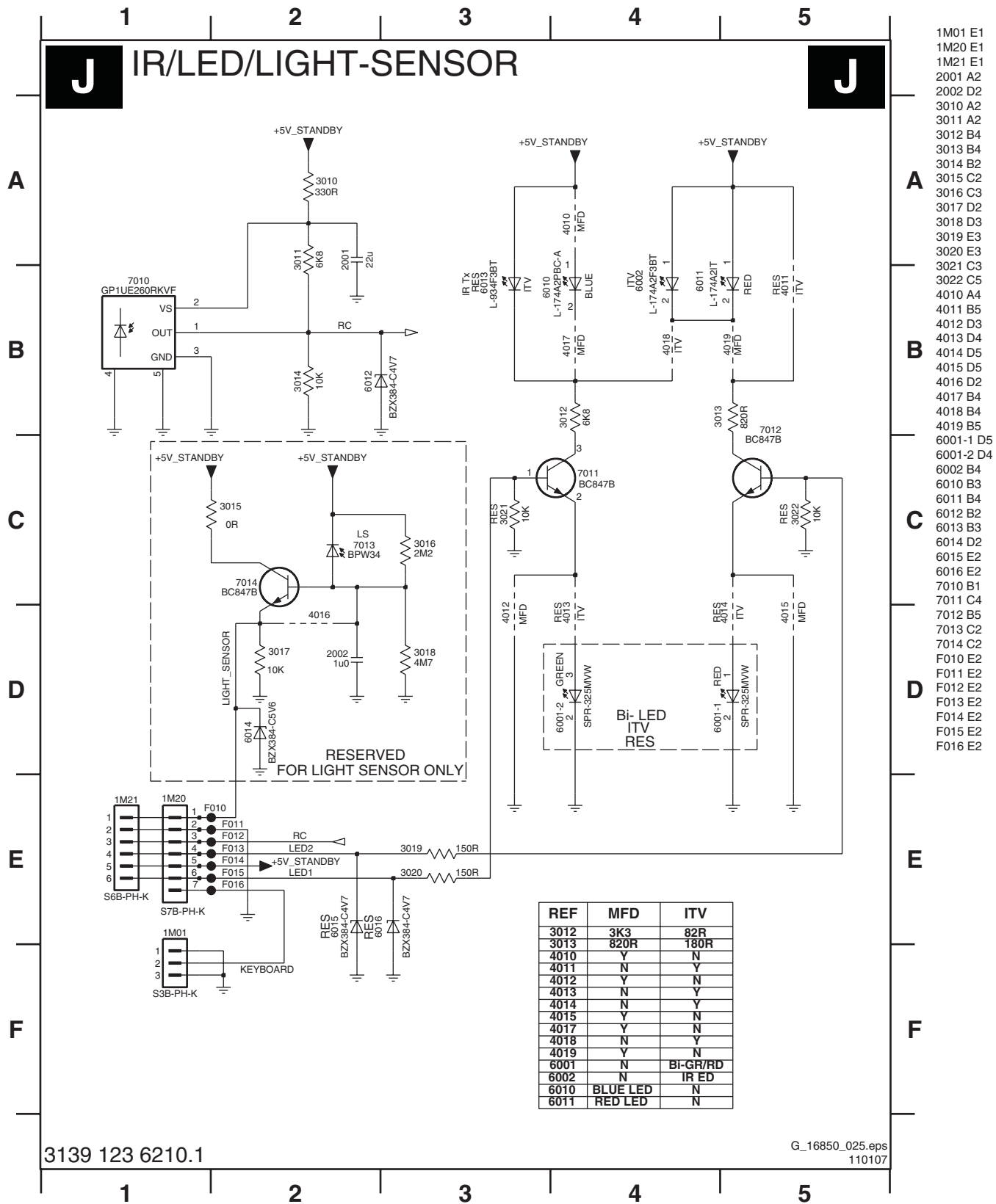
Layout Keyboard Control Panel (Top Side)



Layout Keyboard Control Panel (Bottom Side)



Front IR / LED Panel



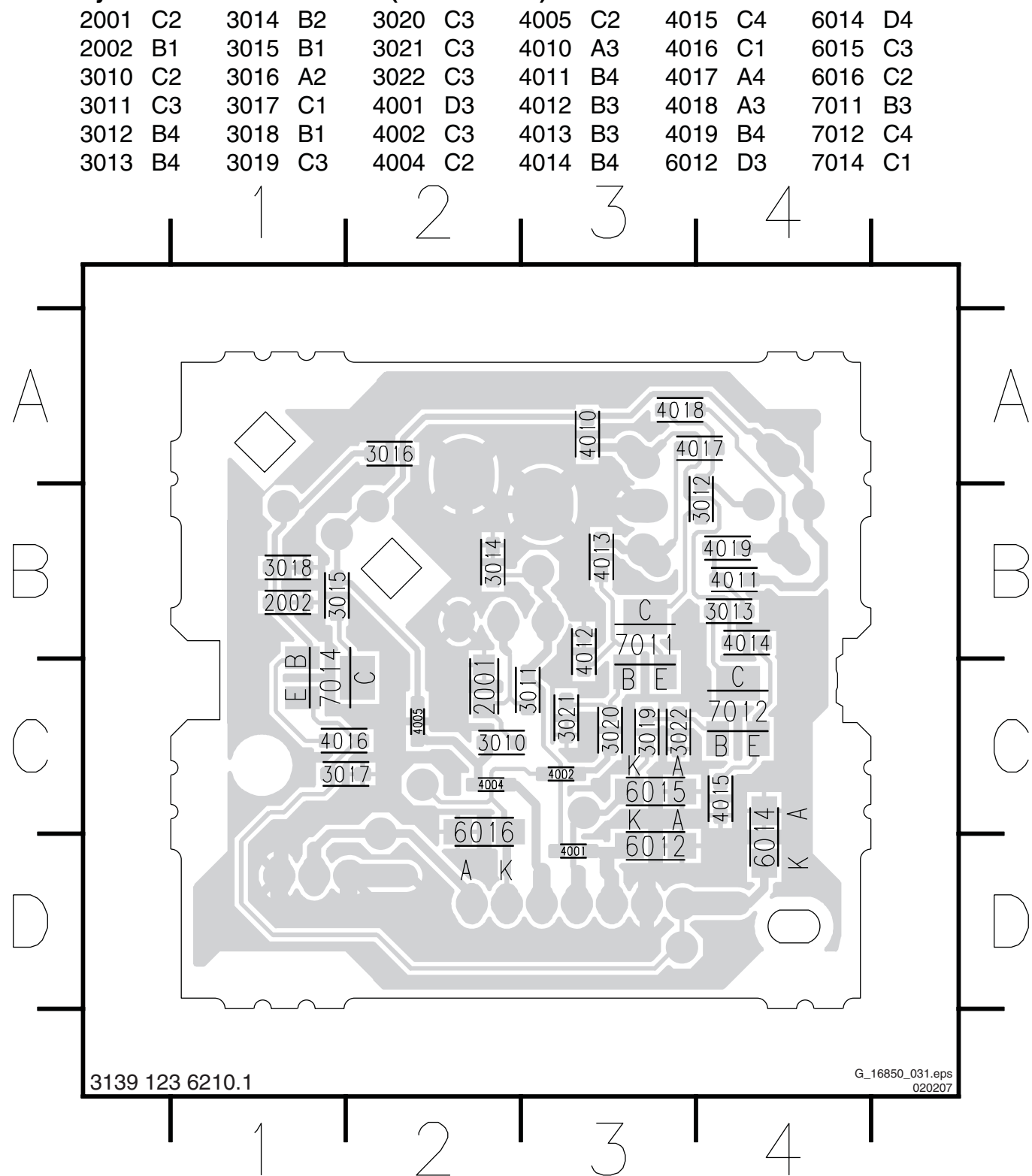
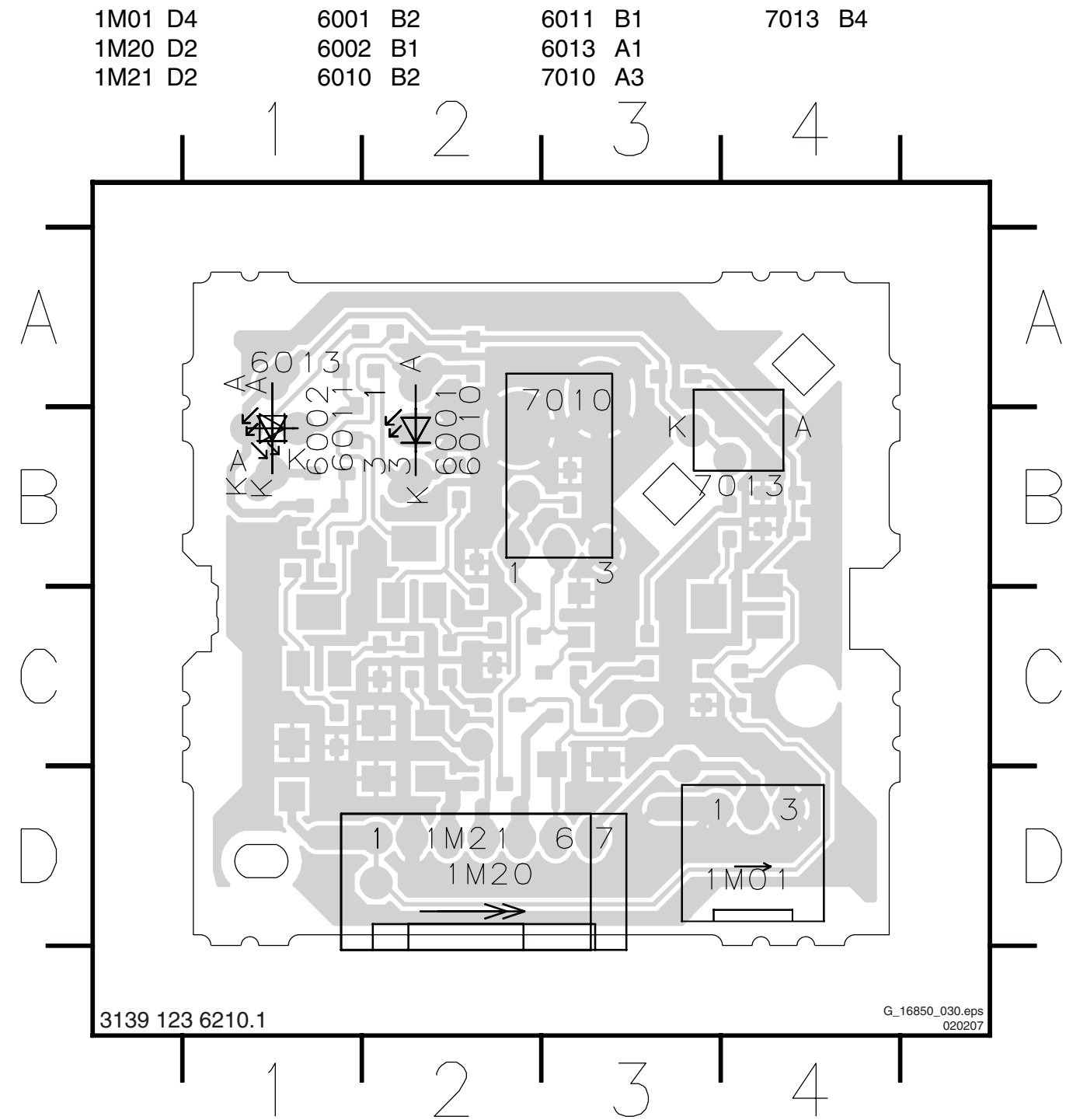
Personal Notes:

1M01 E1  
1M20 E1  
1M21 E1  
2001 A2  
2002 D2  
3010 A2  
3011 A2  
3012 B4  
3013 B4  
3014 B2  
3015 C2  
3016 C3  
3017 D2  
3018 D3  
3019 E3  
3020 E3  
3021 C3  
3022 C5  
4010 A4  
4011 B5  
4012 D3  
4013 D4  
4014 D5  
4015 D5  
4016 D2  
4017 B4  
4018 B4  
4019 B5  
6001-1 D5  
6001-2 D4  
6002 B4  
6010 B3  
6011 B4  
6012 B2  
6013 B3  
6014 D2  
6015 E2  
6016 E2  
7010 B1  
7011 C4  
7012 B5  
7013 C2  
7014 C2  
F010 E2  
F011 E2  
F012 E2  
F013 E2  
F014 E2  
F015 E2  
F016 E2



Layout Front IR / LED Panel (Top Side)

Layout Front IR / LED Panel (Bottom Side)



## 8. Alignments

### Index of this chapter:

- 8.1 General Alignment Conditions
- 8.2 Hardware Alignments
- 8.3 Software Alignments
- 8.4 Option Settings

**Note:** Figures below can deviate slightly from the actual situation, due to the different set executions.

**General:** The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5. Menu navigation is done with the CURSOR UP, DOWN, LEFT or RIGHT keys of the remote control transmitter.

### 8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage (depends on region):
  - AP-NTSC: 120 V<sub>AC</sub> or 230 V<sub>AC</sub> / 50 Hz (± 10%).
  - AP-PAL-multi: 120 - 230 V<sub>AC</sub> / 50 Hz (± 10%).
  - EU: 230 V<sub>AC</sub> / 50 Hz (± 10%).
  - LATAM-NTSC: 120 - 230 V<sub>AC</sub> / 50 Hz (± 10%).
  - US: 120 V<sub>AC</sub> / 60 Hz (± 10%).
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 15 minutes.
- Measure voltages and waveforms in relation to correct ground (e.g. measure audio signals in relation to AUDIO\_GND).
 

**Caution:** It is not allowed to use heatsinks as ground.
- Test probe: R<sub>i</sub> > 10 Mohm, C<sub>i</sub> < 20 pF.
- Use an isolated trimmer/screwdriver to perform alignments.

### 8.2 Hardware Alignments

There are no hardware alignments foreseen for this chassis, but below find an overview of the most important DC voltages on the SSB. These can be used for checking proper functioning of the DC/DC converters.

| Description  | Test Point | Specifications (V) |        |        | Diagram          |
|--------------|------------|--------------------|--------|--------|------------------|
|              |            | Min.               | Typ.   | Max.   |                  |
| +AUDIO_POWER | FB21       | 11.40              | 12.00  | 12.60  | B02_DC-DC        |
| -AUDIO_POWER | FB23       | -11.40             | -12.00 | -12.60 | B02_DC-DC        |
| +12V_DISP    | FB34       | 11.40              | 12.00  | 12.60  | B02_DC-DC        |
| +8V          | F401       | 7.60               | 8.00   | 8.40   | B04C_Audio Proc. |
| +5V_STANDBY  | FB27       | 4.94               | 5.20   | 5.46   | B02_DC-DC        |
| +5V_SW       | FB16       | 4.93               | 5.19   | 5.45   | B02_DC-DC        |
| +5V_D        | I411       | 4.75               | 5.00   | 5.25   | B04C_Audio Proc. |
| +5V_AUD      | I410       | 4.75               | 5.00   | 5.25   | B04C_Audio Proc. |
| +5V_TUN      | I115       | 4.75               | 5.00   | 5.25   | B03_Tuner IF     |
| +3V3_STBY    | FB13       | 3.10               | 3.30   | 3.50   | B02_DC-DC        |
| +3V3_SW      | FB17       | 3.1                | 3.3    | 3.5    | B02_DC-DC        |
| +3V3_MOJO    | FB19       | 3.1                | 3.3    | 3.5    | B02_DC-DC        |
| +3V3         | FJ01       | 3.2                | 3.27   | 3.4    | B03F_DVB-MOJO    |
| +3V3FE       | FF14       | 3.2                | 3.27   | 3.4    | B03B_DVB-Demod   |
| +1V8S_SW     | FB11       | 1.70               | 1.80   | 1.90   | B02_DC-DC        |
| +1V2_MOJO    | FB20       | 1.18               | 1.25   | 1.31   | B02_DC-DC        |
| +1V2_CORE    | FG39       | 1.14               | 1.24   | 1.34   | B03D_DVB-MOJO    |
| V_DISP       | F210       | 11.40              | 12.00  | 12.60  | B04B_Video proc. |

### 8.3 Software Alignments

With the software alignments of the Service Alignment Mode (SAM) the Tuner and RGB settings can be aligned. To store the data: Use the RC button "Menu" to switch to the main menu and next, switch to "Stand-by" mode.

#### 8.3.1 Tuner Adjustment (RF AGC Take Over Point)

**Purpose:** To keep the tuner output signal constant as the input signal amplitude varies.

The LC7.xx chassis comes with two tuner types: the UV1318S for the analogue sets (LC7.1x) and the TD1316AF for the hybrid sets (LC7.2x).

For the digital tuner TD1316AF, no alignment is necessary, as the AGC alignment is done automatically (standard value: "15"), even during analogue reception.

The analogue tuner UV1318S can also use the default value of "15", however in case of problems use the following method (use multimeter and RF generator):

- Apply a vision IF carrier of 38.9 MHz (105 dBuV = 178 mVrms) to test point F111 (input via 50 ohm coaxial cable terminated with an RC network of series 10nF with 120 ohm to ground).
- Measure voltage on pin 1 of the tuner.
- Adjust AGC (via SAM menu: TUNER -> AGC), until voltage on pin 1 is 3.3 +0.5/-1.0 V.
- Store settings and exit SAM.

#### 8.3.2 RGB Alignment

Before alignment, choose "TV MENU" -> "Picture" and set:

- "Brightness" to "50".
- "Colour" to "50".
- "Contrast" to "100".

#### White Tone Alignment:

- Activate SAM.
- Select "RGB Align." -> "White Tone" and choose a colour temperature.
- Use a 100% white screen as input signal and set the following values:
  - All "White point" values initial to "256".
  - All "BlackL Offset" values to "0".

In case you have a colour analyser:

- Measure with a calibrated (phosphor- independent) colour analyser (e.g. Minolta CA-210) in the centre of the screen. Consequently, the measurement needs to be done in a dark environment.
- Adjust the correct x,y coordinates (while holding one of the White point registers R, G or B on "256") by means of decreasing the value of one or two other white points to the correct x,y coordinates (see table "White D alignment values"). Tolerance: dx: ± 0.004, dy: ± 0.004.
- Repeat this step for the other colour Temperatures that need to be aligned.
- When finished return to the SAM root menu and press STANDBY on the RC to store the aligned values to the NVM.

**Table 8-1 White D alignment values**

| Value | Cool (11000 K) | Normal (9000 K) | Warm (6500 K) |
|-------|----------------|-----------------|---------------|
| x     | 0.276          | 0.287           | 0.314         |
| y     | 0.282          | 0.296           | 0.324         |

If you do **not** have a colour analyser, you can use the default values. This is the next best solution. The default values are average values coming from production (statistics).

- Set the RED, GREEN and BLUE default values per temperature according to the values in the "Tint settings" table.

- When finished return to the SAM root menu and press STANDBY on the RC to store the aligned values to the NVM.

Table 8-2 Tint settings 42”

| Colour Temp. | R   | G   | B   |
|--------------|-----|-----|-----|
| Cool         | 255 | 247 | 250 |
| Normal       | 255 | 243 | 234 |
| Warm         | 255 | 228 | 196 |

**Note:** data for 50” was not available at time of printing.

**Black Level Offset Alignment**

- Activate SAM.
- Select “RGB Align.” -> “BlackL Offset” and choose a colour.
- Set all “BlackL Offset” values per temperature according to the values in the “Black level offset settings” table.
- When finished return to the SAM root menu and press STANDBY on the RC to store the aligned values to the NVM.

Table 8-3 Black level offset settings 42”

| Black-level offset | R | G  | B  |
|--------------------|---|----|----|
| Black-level offset | 3 | -9 | 95 |

**Note:** data for 50” was not available at time of printing.

**ADC YPbPr Gray Scale Alignment**

When the grey scale is not correct, use this alignment:

- Activate SAM.
- Select “NVM Editor”.
- Enter address “26(dec)” (ADR).
- Set value (VAL) to “197(dec) ± 25”.
- Store (STORE) the value.

8.4 Option Settings

8.4.1 Introduction

The microprocessor communicates with a large number of I<sup>2</sup>C ICs in the set. To ensure good communication and to make digital diagnosis possible, the microprocessor has to know which ICs to address. The presence/absence of these specific ICs (or functions) is made known by the option codes.

**Notes:**

- After changing the option(s), save them with the STORE command.
- The new option setting becomes active after the TV is switched "off" and "on" again with the mains switch (the EAROM is then read again).

8.4.2 How To Set Option Codes

When the NVM is replaced, all options will require resetting. To be certain that the factory settings are reproduced exactly, you must set all option numbers. You can find the correct option numbers in table “Option Codes OP1...OP7” below.

**How to Change Options Codes**

An option code (or “option byte”) represents eight different options (bits). When you change these numbers directly, you can set all options very quickly. All options are controlled via seven option bytes (OP1... OP7).

Activate SAM and select “Options”. Now you can select the option byte (OP1.. OP7) with the CURSOR UP/ DOWN keys, and enter the new 3 digit (decimal) value. For the correct factory default settings, see the next table “Option codes OP1...OP7”. For more detailed information, see the second table “Option codes at bit level”. If an option is set (value “1”), it represents a certain decimal value.

When all the correct options (bits) are set, the sum of the decimal values of each Option Byte (OP) will give the option code.

If you do not have a picture (i.e. after an SSB or display exchange), it is required to set the display option code first after such a repair. Refer to section “Display Option Code Selection” in chapter 5 “Service Modes, Error Codes, and Fault Finding” for details. Refer to table “Option codes OP1 ...OP7 (for all LC7.2E models)” for the correct display option code.

| Sets 12NC                        | Sets Type     | Panel Type     | Panel Code (Dec) | Option Byte |     |     |     |         |     |     |
|----------------------------------|---------------|----------------|------------------|-------------|-----|-----|-----|---------|-----|-----|
|                                  |               |                |                  | Group 1     |     |     |     | Group 2 |     |     |
|                                  |               |                |                  | 1           | 2   | 3   | 4   | 5       | 6   | 7   |
| LC07_EU_DTV_PDP_UK (/05)         |               |                |                  |             |     |     |     |         |     |     |
| 867000025288                     | 42PFP5532D/05 | SDI : 42 HD W2 | 083              | 019         | 007 | 011 | 223 | 009     | 002 | 003 |
|                                  |               | LG : 42 HD X4  | 084              |             |     |     |     |         |     |     |
| 867000025289                     | 50PFP5532D/05 | SDI : 50 HD W2 | 085              |             |     |     |     |         |     |     |
|                                  |               | LG : 50 HD X4  | 086              |             |     |     |     |         |     |     |
| LC07_EU_DTV_PDP_Pan Europe (/12) |               |                |                  |             |     |     |     |         |     |     |
| 867000026881                     | 42PFP5532D/12 | SDI : 42 HD W2 | 083              | 019         | 007 | 011 | 223 | 009     | 002 | 003 |
|                                  |               | LG : 42 HD X4  | 084              |             |     |     |     |         |     |     |
| 867000026885                     | 50PFP5532D/12 | SDI : 50 HD W2 | 085              |             |     |     |     |         |     |     |
|                                  |               | LG : 50 HD X4  | 086              |             |     |     |     |         |     |     |

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Figure 8-1 Option codes OP1...OP7 (for all LC7.2E models)

**Option Bit Overview**

Below find an overview of the Option Codes on **bit** level.

**Table 8-5 Option codes at bit level (OP1-OP4)**

| Option Byte & Bit | Dec. Value | Option Name       | Description                                                                                                     |
|-------------------|------------|-------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Byte OP1</b>   |            |                   |                                                                                                                 |
| Bit 7 (MSB)       | 128        | Reserved          | Not Used (Reserved)                                                                                             |
| Bit 6             | 64         | CHINA             | ON = SW is for CHINA only<br>OFF = SW is for Non-China AP cluster                                               |
| Bit 5             | 32         | DTV_CHINA         | ON = DTV_CHINA will be available (Reserved)<br>OFF = DTV_CHINA will not be available                            |
| Bit 4             | 16         | DTV_EU            | ON = DTV will be available<br>OFF = DTV will not be available                                                   |
| Bit 3             | 8          | UK_PNP            | ON = UK PNP is available<br>OFF = UK PNP is not available                                                       |
| Bit 2             | 4          | VIRGIN_MODE       | ON = Virgin Mode (PNP) is available<br>OFF = Virgin Mode (PNP) is not available                                 |
| Bit 1             | 2          | ACI               | ON = ACI is available<br>OFF = ACI is not available                                                             |
| Bit 0 (LSB)       | 1          | ATS               | ON = ATS is available<br>OFF = ATS is not available                                                             |
| Total DEC Value   |            |                   |                                                                                                                 |
| <b>Byte OP2</b>   |            |                   |                                                                                                                 |
| Bit 7 (MSB)       | 128        | 1080P             | ON = 1080p is available<br>OFF = 1080p is not available                                                         |
| Bit 6             | 64         | LIGHT_SENSOR      | ON = Light Sensor is available<br>OFF = Light Sensor is not available                                           |
| Bit 5             | 32         | AMBILIGHT         | ON = Ambilight Feature will be available<br>OFF = Ambilight Feature will not be available                       |
| Bit 4             | 16         | BACKLIGHT_DIMMING | ON = Backlight Dimming is available<br>OFF = Backlight Dimming is not available                                 |
| Bit 3             | 8          | HUE               | ON = Hue is available<br>OFF = Hue is not available                                                             |
| Bit 2             | 4          | 2D3DCF            | ON = 3D Comb Filter is available<br>OFF = 2D Comb Filter is available                                           |
| Bit 1             | 2          | WSSB              | ON = WSS is available<br>OFF = WSS is not available                                                             |
| Bit 0 (LSB)       | 1          | WIDE_SCREEN       | ON = TV is 16x9 set<br>OFF = TV is 4x3 set                                                                      |
| Total DEC Value   |            |                   |                                                                                                                 |
| <b>Byte OP3</b>   |            |                   |                                                                                                                 |
| Bit 7 (MSB)       | 128        | CVI2              | ON=CVI1 (YPbPr)<br>(For ROW)                                                                                    |
| Bit 6             | 64         | Reserved          | Not Used (Reserved)                                                                                             |
| Bit 5             | 32         | Reserved          | Not Used (Reserved)                                                                                             |
| Bit 4             | 16         | VCHIP             | ON = VChip is available<br>OFF = VChip is not available                                                         |
| Bit 3             | 8          | VIDEO_TEXT        | ON = Video-TXT is available<br>OFF = Video-TXT is not available                                                 |
| Bit 2             | 4          | STEREO_DBX        | ON = Stereo DBX detection is available (LATAM)<br>OFF = Stereo DBX detection is not available                   |
| Bit 1             | 2          | STEREO_NICAM_2CS  | ON = Stereo NICAM 2CS detection is available (EU/AP/China)<br>OFF = Stereo NICAM 2CS detection is not available |
| Bit 0 (LSB)       | 1          | LIP_SYNC          | ON = Lip Sync is available<br>OFF = Lip Sync is not available                                                   |
| Total DEC Value   |            |                   |                                                                                                                 |
| <b>Byte OP4</b>   |            |                   |                                                                                                                 |
| Bit 7 (MSB)       | 128        | HDMI2             | ON = HDMI2 is available<br>OFF = HDMI2 is not available                                                         |
| Bit 6             | 64         | HDMI1             | ON = HDMI1 is available<br>OFF = HDMI1 is not available                                                         |
| Bit 5             | 32         | VGA               | ON = VGA is available<br>OFF = VGA is not available                                                             |
| Bit 4             | 16         | SVHS3             | ON = SVHS3 is available<br>OFF = SVHS3 is not available                                                         |
| Bit 3             | 8          | AV3               | ON = AV3 is available<br>OFF = AV3 is not available                                                             |
| Bit 2             | 4          | CVI               | ON = CVI is available<br>OFF = CVI is not available                                                             |
| Bit 1             | 2          | SVHS2             | ON = SVHS2 is available<br>OFF = SVHS2 is not available                                                         |
| Bit 0 (LSB)       | 1          | AV2               | ON = AV2 is available<br>OFF = AV2 is not available                                                             |
| Total DEC Value   |            |                   |                                                                                                                 |

Table 8-6 Option codes at bit level (OP5-OP7)

| Option Byte & Bit | Dec. Value | Option Name     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------|------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Byte OP5          |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bit 7 (MSB)       | 128        | NVM_CHECK       | ON = NVM (range) checking is available<br>OFF = NVM (range) checking is not available                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Bit 6             | 64         | Reserved        | Not Used (Reserved)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Bit 5             | 32         | Reserved        | Not Used (Reserved)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Bit 4             | 16         | MP_ALIGN        | ON = Using multi-point alignment for Gamma & White Point<br>OFF = Using old way for Gamma (pre-defined) & WP alignment                                                                                                                                                                                                                                                                                                                                                                                            |
| Bit 3             | 8          | SYS_RECVRY      | ON = System Recovery is available<br>OFF = System Recovery is not available                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Bit 2             | 4          | SL_WIRED        | ON = BDS Smart Loader Wired is available<br>OFF = BDS Smart Loader Wired is not available                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Bit 1             | 2          | HOTEL           | ON = Hotel/BDS is available<br>OFF = Hotel/BDS is not available                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bit 0 (LSB)       | 1          | SS_DEMO         | ON = Split Screen Demo is available<br>OFF = Split Screen is not available                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Total DEC Value   |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Byte OP6          |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bit 7 (MSB)       | 128        | Reserved        | Not Used (Reserved)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Bit 6             | 64         | Reserved        | Not Used (Reserved)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Bit 5             | 32         | Reserved        | Not Used (Reserved)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Bit 4             | 16         | Reserved        | Not Used (Reserved)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Bit 3             | 8          | TUNER PROFILE   | 0 = ATV_EU_PHILIPS UV1318S/AIH-3<br>1 = ATV_EU_Panasonic EN57K28G3F<br>2 = DTV_EU_PHILIPS TD1316AF/IHP-2<br>4 = ATV_AP_PHILIPS UV1316E/AIH-4<br>5 = ATV_AP_Tuner2 (Reserved)<br>6 = ATV_CHINA_ALPS TEDE9-286B<br>7 = ATV_CHINA_Tuner2 (Reserved)<br>8 = ATV_LATAM_PHILIPS UV1338/AIH-4<br>9 = ATV_LATAM_Tuner2 (Reserved)<br>10 = DTV_CHINA_Tuner1 (Reserved)<br>11 = DTV_CHINA_Tuner2 (Reserved)<br>12 = Not Used (Reserved)<br>13 = Not Used (Reserved)<br>14 = Not Used (Reserved)<br>15 = Not Used (Reserved) |
| Bit 2             | 4          |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bit 1             | 2          |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bit 0 (LSB)       | 1          |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                   |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Total DEC Value   |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Byte OP7          |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bit 7 (MSB)       | 128        | Reserved        | Not Used (Reserved)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Bit 6             | 64         | Reserved        | Not Used (Reserved)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Bit 5             | 32         | Reserved        | Not Used (Reserved)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Bit 4             | 16         | CABINET PROFILE | 0 = Cabinet_Profile_26_LCD_ME7<br>1 = Cabinet_Profile_32_LCD_ME7<br>2 = Cabinet_Profile_37_42_47_LCD_ME7<br>3 = Cabinet_Profile_42_50_PDP_ME7<br>4 = Cabinet_Profile_26_LCD_ME5P<br>5 - 32 = Reserved                                                                                                                                                                                                                                                                                                             |
| Bit 3             | 8          |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bit 2             | 4          |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bit 1             | 2          |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bit 0 (LSB)       | 1          |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Total DEC Value   |            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



## 9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

### Index of this chapter:

- 9.1 Introduction
- 9.2 PDP Power Supply
- 9.3 DC/DC converters
- 9.4 Front-End
- 9.5 DVB-T Signal Processing
- 9.6 Video Processing
- 9.7 Memory addressing
- 9.8 Audio Processing
- 9.9 HDMI
- 9.10 Abbreviation List
- 9.11 IC Data Sheets

### Notes:

- Only **new** circuits (circuits that are not published recently) are described.
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the Wiring, Block (chapter 6) and Circuit Diagrams (chapter 7). Where necessary, you will find a separate drawing for clarification.

### 9.1 Introduction

The LC7.x (development name “LC07”) is a new global chassis for the year 2007 (LC7.1 is the analogue range, LC7.2 is the digital range). It is the successor of the LC4.x chassis, and covers a screen size of 26 to 47 inch for LCD and 42 to 50 inch for Plasma sets with a new styling called “ME7”. Some key components are:

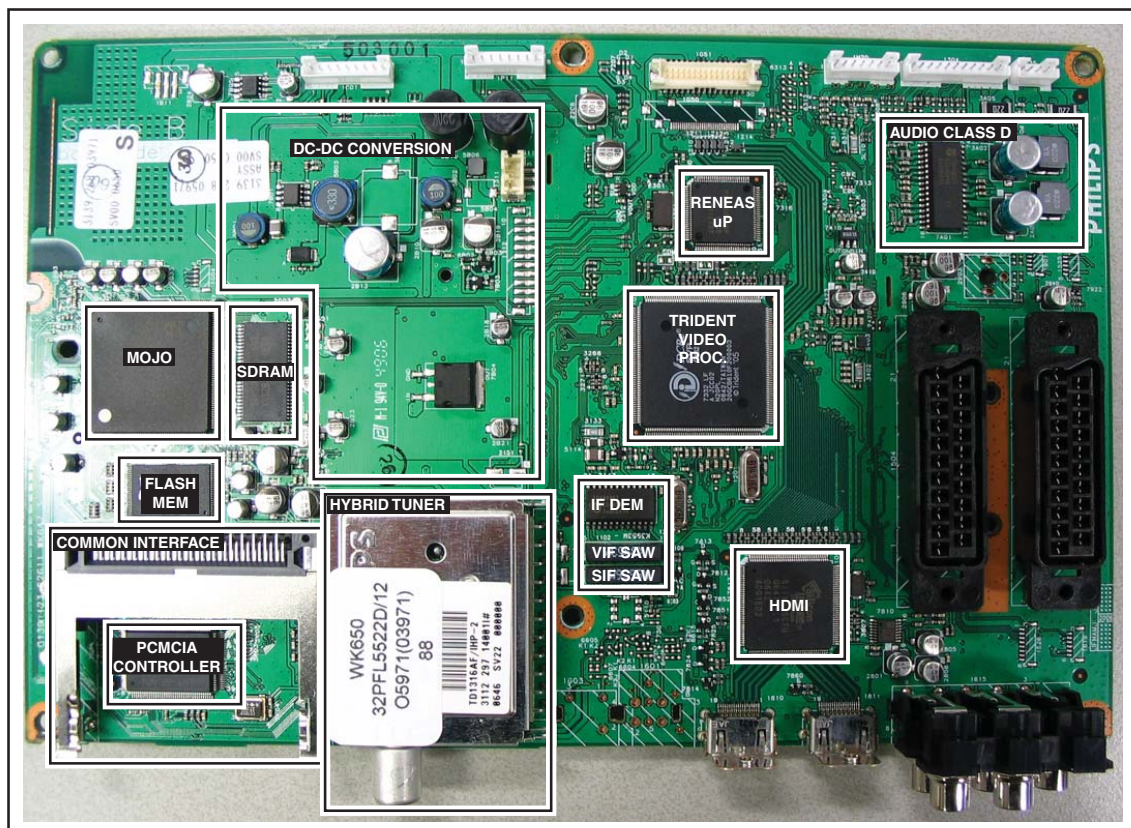
- **Audio:** Sound processing is performed by a multi-standard sound processor MSP4450 (item 7411)
- **Video:** Video processing is performed by the Trident video processor SVP CV32-LF (item 7202).

For analogue reception, a standard IF demodulator is used, whereas digital input signals (DVB-T) are processed through a COFDM channel decoder together with an MPEG decoder (integrated on the SSB). A so-called “Reneas” microprocessor performs the control functionality.

#### 9.1.1 SSB Cell Layout

Description of the functional blocks (top side):

- In the middle, there is the Trident video processor.
- Above it, there is the Reneas micro processor.
- At the right hand top, there is the audio class D amplifier.
- The left part of the SSB contains the digital reception circuit. In the LC4.x, this was a separate module, here it is integrated on the SSB (same MOJO chipset).
- Between the digital reception part and the Trident part, there is the DC/DC conversion circuit.

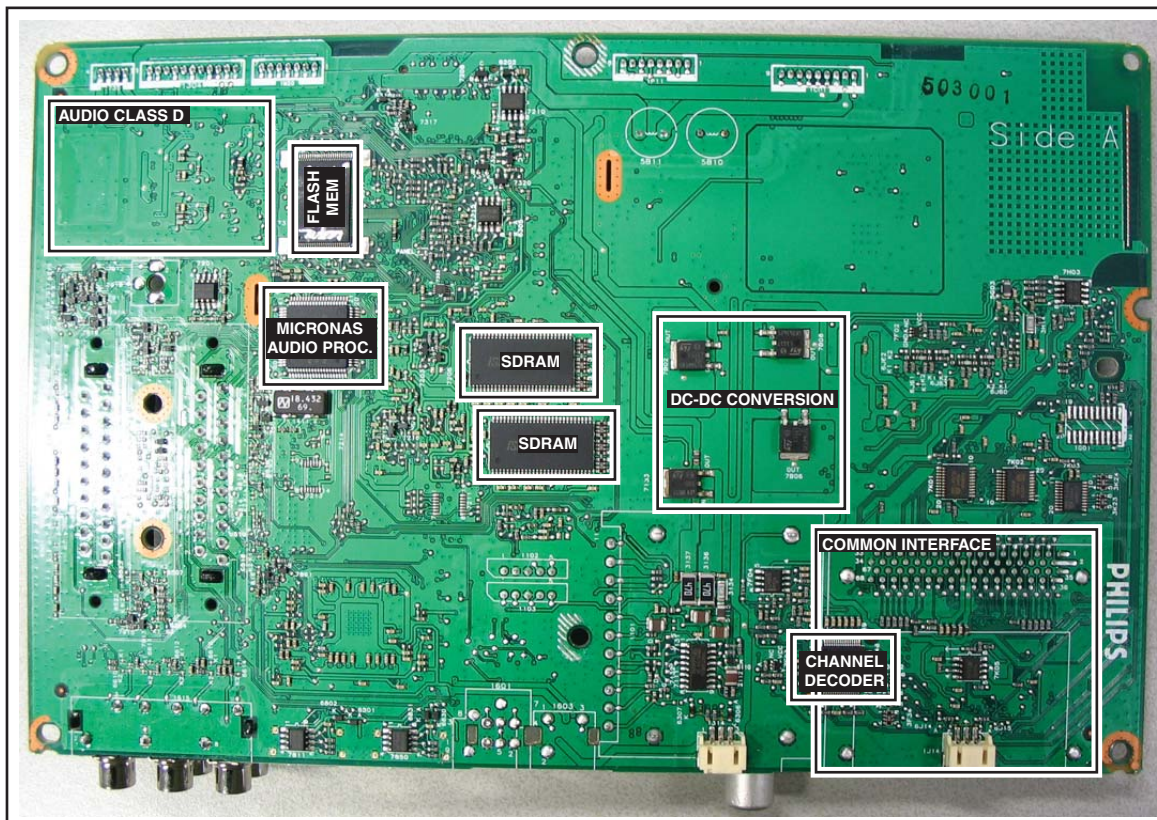


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Figure 9-1 SSB top view

Description of the functional blocks (bottom side):

- The “Flash Mem” chip contains the software of the TV.
- The “Micronas” is the audio demodulator/processor.
- The two SDRAM’s are used for the video processing.
- The right part of the SSB contains the digital reception circuit. This side contains the channel decoder.
- There are two connectors for ComPair:
  - One on the other side of the tuner for I2C communication with the Reneas micro processor.
  - The other one at the digital reception part, for UART communication with the MOJO.



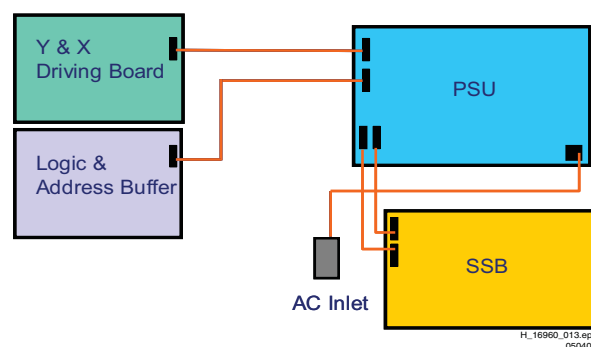
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Figure 9-2 SSB bottom view

## 9.2 PDP Power Supply

The Power Supply Unit (PSU) in this chassis is a buy-in and is a black-box for Service. It belongs to the PDP and when defective, a new panel must be ordered and the defective panel must be returned for repair, unless one of the fuses of the unit is broken. Always replace the fuse with one of the correct specifications! This part is commonly available in the regular market. For the correct order number, refer to the SDI PDP Service Manual (order code see front page of this manual). The 42" and 50" supply units have different specifications.

Figure “Overview of PSU connectivity” shows the connectivity of the Power Supply Unit with the other panels in the set.



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Figure 9-3 Overview of PSU connectivity

All Power Supply Units deliver the following voltages / signals to the chassis:

- +12 V to SSB (+12V\_DISP).
- +12 V and -12 V to Audio Supply (-AUDIO\_POWER, +AUDIO\_POWER).
- + 5 V switch voltage (+5V+SW).
- +5.2 V standby voltage (+5V\_STANDBY).



### 9.3 DC/DC converters

A switch generates the +5.2 V (+5V\_SW) from the +5.2 V (+5V\_STANDBY) supply voltage. For LCD sets, this switch is mounted on-board the SSB. For PDP sets, this switch is mounted on the Power Supply Panel. This results in the +5V\_STANDBY (and +5V\_SW for PDP sets) voltage(s), coming from the Power Supply Unit, is (are) used as input for the on-board DC/DC converters.

They deliver the following voltages to the board:

- +3.3 V (+3V3\_STBY)
- +5.2 V (+5V\_SW) (only for LCD sets)
- +1.8 V (+1V8S\_SW)
- +34 V (+VTUN)
- +3.3 V (+3V3\_SW)
- +3.3 V (+3V3\_MOJO)
- +1.2 V (+1V2\_MOJO)

An overview can be found in figure “DC-DC converter block diagram”.

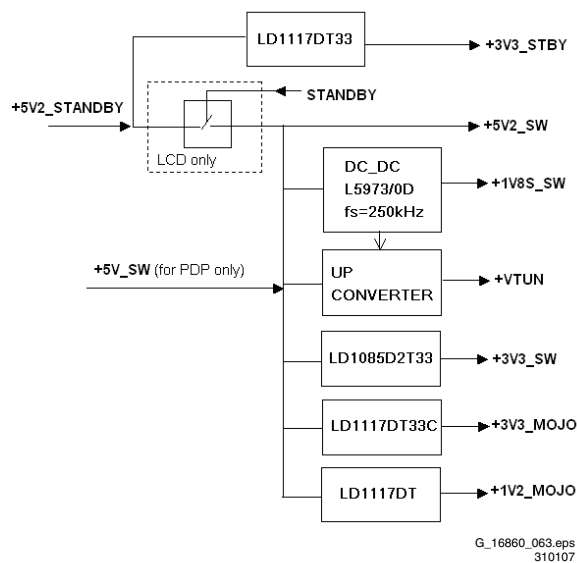


Figure 9-4 DC-DC converter block diagram

The +5 V switch, needed for the switch voltages, is for LCD sets physically mounted on the SSB, whereas for the PDP sets it is physically mounted on the PSU board.

### 9.4 Front-End

This chassis uses different tuners depending on the region. An overview of region-dependency can be found in table “Tuner diversity”.

Table 9-1 Tuner diversity

| Region | Tuner    | Type     |
|--------|----------|----------|
| Europe | TD1316AF | Hybrid   |
|        | UV1318S  | analogue |
| AP     | UV1316E  | analogue |
| China  | TEDE9    | analogue |
| Latam  | UV1338   | analogue |

The TD1316AF hybrid tuner used, is capable of receiving both analogue and digital (DVB-T) signals. For the application in this chassis see figure “Tuner IF diagram”.

The pin assignment of all analogue tuners is equal and can be found in table “Pin assignment analogue tuners”.

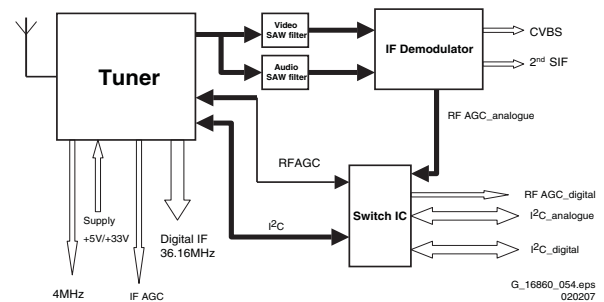


Figure 9-5 Tuner IF diagram

While receiving analogue signals, the signal coming from the tuner is fed to the IF demodulator (through the SAW filters) and then passed to the Trident Video Processor.

While receiving digital signals, the signal coming from the tuner is fed to the channel decoder, to the MPEG decoder and then to the Trident Video Processor.

#### 9.4.1 Video IF Amplifier

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. One for filtering IF-video (item 1102) and one for IF-audio (item 1103). The type of these filters depends on the standard to be received (region-dependency). Some filters can be switched to another standard, what makes them suitable for applications in multi-standard platforms. An overview of the SAW filter diversity can be found in table “SAW filter diversity”.

Table 9-2 SAW filter diversity

| SAW filter | Switching Y/N | Region | Video/Audio |
|------------|---------------|--------|-------------|
| OFWK3953M  | No            | Europe | Video       |
| OFWK9656M  | Yes           | Europe | Audio       |
| OFWK7265L  | Yes           | AP     | Video       |
| OFWK9361L  | No            | AP     | Sound       |
| OFWK3956L  | No            | China  | Video       |
| OFWK3955L  | No            | China  | Video       |
| OFWK9352L  | No            | China  | Audio       |
| OFWM1967L  | No            | LATAM  | Video/Audio |

Switching is done by the microcontroller via SAW\_SW. In table “SAW filter switching” is explained how to address the different system standards.

Table 9-3 SAW filter switching

| Region | SAW_SW | System        |
|--------|--------|---------------|
| Europe | 1      | L'            |
|        | 0      | other systems |
| AP     | 1      | B/G, D/K, I   |
|        | 0      | M/N           |
| China  | 1      | B/G, D/K, I   |
|        | 0      | M/N           |
| LATAM  | n.a.   | M/N           |

The hybrid tuner TDA1316AF, used in Europe sets, needs to be switched between digital and analogue mode. This is done by the microcontroller via DVB\_SW. Refer to table “Hybrid tuner digital/analogue switching” for details.

Table 9-4 Hybrid tuner digital/analogue switching

| Region | DVB_SW | Mode               |
|--------|--------|--------------------|
| Europe | 1      | analogue reception |
|        | 0      | Digital reception  |

Table 9-5 Pin assignment analogue tuners

| Pin number | Description                         | DC voltage (V)                                         |
|------------|-------------------------------------|--------------------------------------------------------|
| 1          | RF AGC voltage                      | 3.3 - 4.5 (weak or no signal)<br>< 3.3 (strong signal) |
| 2          | n.c.                                |                                                        |
| 3          | I <sup>2</sup> C-bus address select | 0                                                      |
| 4          | SCL                                 | 0 to 3.3                                               |
| 5          | SDA                                 | 0 to 3.3                                               |
| 6          | n.c.                                |                                                        |
| 7          | supply voltage                      | 5 ±0.25                                                |
| 8          | n.c.                                |                                                        |
| 9          | tuning supply voltage               | 33                                                     |
| 10         | n.c.                                |                                                        |
| 11         | TV IF output                        |                                                        |

The pin assignment of the hybrid tuner can be found in table “Pin assignment hybrid tuner”.

Table 9-6 Pin assignment hybrid tuner

| Pin number | Description                         | DC voltage (V)                                         |
|------------|-------------------------------------|--------------------------------------------------------|
| 1          | n.c.                                |                                                        |
| 2          | RF AGC voltage                      | 3.3 - 4.5 (weak or no signal)<br>< 3.3 (strong signal) |
| 3          | I <sup>2</sup> C-bus address select | 0                                                      |
| 4          | SCL                                 | 0 to 3.3                                               |
| 5          | SDA                                 | 0 to 3.3                                               |
| 6          | 4 MHz reference output              |                                                        |
| 7          | supply voltage                      | 5 ±0.25                                                |
| 8          | broadband IF output                 |                                                        |
| 9          | IF AGC voltage                      | 0 to 3                                                 |
| 10         | narrowband IF output                |                                                        |
| 11         | narrowband IF output                |                                                        |

9.4.2 Automatic Gain Control

During analogue reception, the hybrid tuner receives an external AGC voltage, coming from the demodulator to perform automatic gain control. During digital reception, no external AGC voltage is used but the tuners internal AGC loop is used.

9.5.2 Supply

9.5 DVB-T Signal Processing

The DVB-T cell on the SSB is built around the “MOJO” MPEG decoder PNx8314HS (item 7G00) and receives the signal from the COFDM Channel Decoder TDA10046 (item 7F01). The (hybrid) tuner TD1316AF (item 1101) supports digital (DVB-T) reception and transports the signal via the VIM\_IBO and VIP\_IBO lines. The digital data stream exits the DVB-T cell when it is fed to the Trident SVP CX32 Video Processor (item 7202). A Common Interface (CI) slot allows reception of encoded signals when used with a Conditional Access Module (CAM) in combination with a smart card. See figure “Block diagram DVB-T reception” for details.

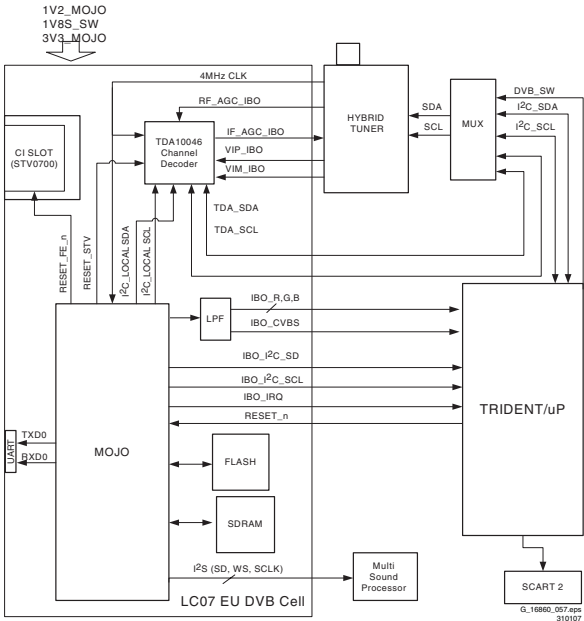


Figure 9-6 Block diagram DVB-T reception

9.5.1 Common Interface (CI)

Introduction

The digital sets of this chassis are provided with a special slot called Common Interface (CI). Together with a Conditional Access Module (CAM) and a smart card, it is possible to receive scrambled TV programs. This means that it is not necessary to have a separate Set Top Box to receive digital cable SDTV and HDTV programs (however this still is possible).

The removable smart card, distributed by cable companies, allows you to tune digital and high definition scrambled or encrypted cable channels through the cable antenna. The smart card is also required to receive premium digital TV channels and services (where available) through the cable. A smart card functionality includes conditional access and copy protection.

Implementation

1. The receiver receives the digital data stream.
2. The data flows into the Conditional Access Module, which contains the content provider's unscrambling algorithms.
3. This module verifies the existence of a smart card that contains the subscriber's authorization code.
4. If the authorization code is accepted, the CAM unscrambles the data and returns the data to the receiver (if the code is not accepted, the data remains scrambled, restricting access).
5. The receiver then decodes the data and outputs it for viewing.

The internal voltages that are used are:

- 5 V (+5V\_SW)

- 3.3 V (+3V3\_MOJO)
- 1.2 V (+1V2\_MOJO)
- 1.8 V (+1V8S\_SW).

During start-up, it is important that the +1V8S\_SW line comes up earlier than the +3V3\_MOJO line. In order to implement this, a delay circuit is added which is shown in figure “Delay circuitry”.

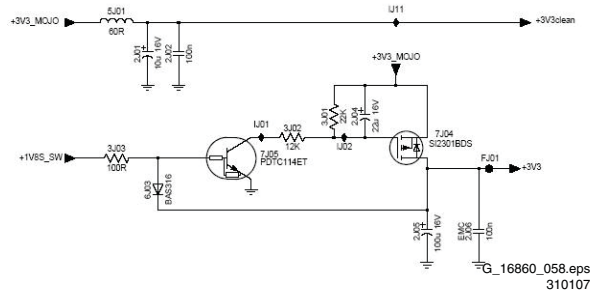


Figure 9-7 Delay circuitry

Item 7J05 switches the MOSFET “on” and “off” (item 7J04). The diode (item 6J03) performs a short-circuit protection for the +3V3 output stage.

## 9.6 Video Processing

The video processing is completely handled by the Trident SVP CX32 video processor which features:

- CVBS-input for analogue signals.
- RGB-input for digital (DVB-T) signals.
- Motion and “edge-adaptive” de-interlacing.
- Integrated ADC.
- Built-in 8-bit LVDS transmitter.
- Colour stretch.
- Skin colour enhancement.
- 3D Digital Comb Video Decoder.
- Interlaced and Progressive Scan refresh.
- TeleText decoding.
- OSD and VBI/Closed Caption.

### 9.6.1 Video Application

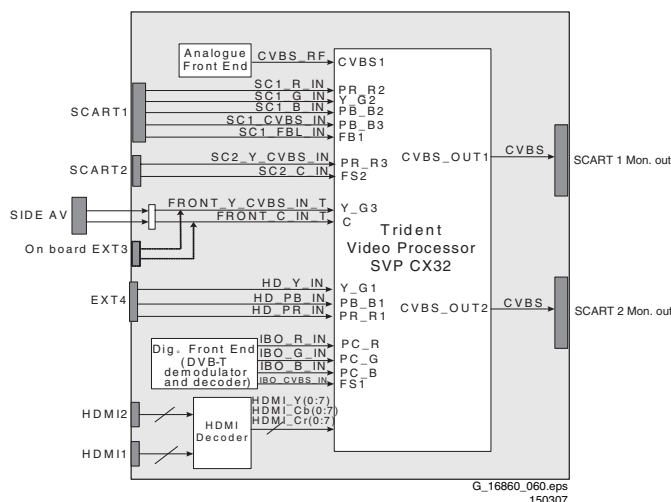


Figure 9-8 Block diagram video processing

“Block diagram video processing” shows the input and output signals to and from the Trident Video Processor in EU applications.

During analogue reception, a CVBS signal coming from the analogue front-end is fed to the video processor via pin CVBS1. During digital reception, the video signal coming from the MPEG decoder (MOJO) is fed to the video processor via pins FS1, PC\_B, PC\_G and PC\_R.

The video processor also interfaces the SCART1 & 2 input, side AV, EXT4 (HD where applicable) and HDMI1 & 2 input. Through the SCART1 & 2 connectors, a monitor output is foreseen.

## 9.7 Memory addressing

Figure “Memory block diagram” shows the interconnection between the microprocessor, the FLASH memory, the Trident Video Processor and the SDRAM.

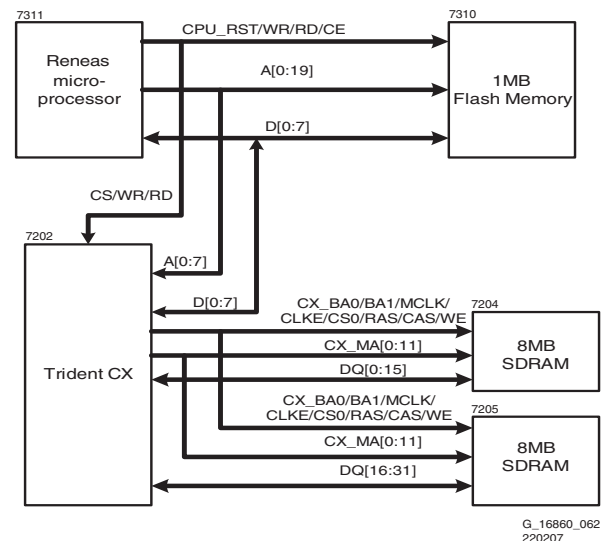


Figure 9-9 Memory block diagram

Control signals CPU\_RST, WR, RD and CE, address lines A[0:19] and data lines D[0:7] are used for transferring data between the microprocessor (item 7311) and the flash memory (item 7310). Control signals CS, WR and RD, address lines A[0:7] and data lines D[0:7] are used for transferring data between the Trident Video Processor (item 7202) and the microprocessor (item 7311). Control signals CX\_BA0, CX\_BA1, CX\_MCLK, CX\_CLKE, CX\_CS0, CX\_RAS, CX\_CAS and CX\_WE, address lines CX\_MA[0:11] and data lines DQ[0:15] are used for transferring data between the Trident Video Processor and the SDRAM ICs (items 7204 and 7205).



### 9.8 Audio Processing

The audio decoding is done entirely via the Multistandard Sound Processor (MSP) 4450P (item 7411). This processor covers the processing of both analogue and (NICAM) digital input signals by processing the (analogue) IF signal-in to processed (analogue) AF-out (baseband audio). An internal 40 ms (stereo) audio delay line (LIP SYNC) is foreseen and therefore no external delay line is necessary.

All internal clock signals are derived from an external 18.432 MHz oscillator, which, in NICAM or I<sup>2</sup>S-mode, on its turn is locked to the corresponding source.

- The following functionality is included:
- Automatic Standard Detection (ASD) automatically detects the actual broadcasted TV standard
  - Automatic Sound Select (ASS) automatically switches (without any I<sup>2</sup>C-bus action) between mono/stereo/bilingual mode when the broadcast mode changes.

#### 9.8.1 Audio Application

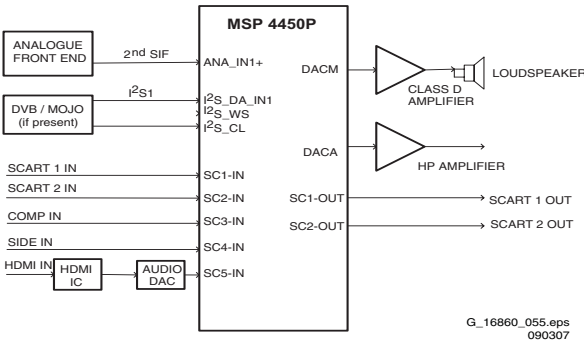


Figure 9-10 Block diagram audio processing - EU application

- In EU applications, the MSP features:
- Sound IF input for signals coming from the analogue front-end
  - Three I<sup>2</sup>S-inputs for signals (“DATA”, “CLK” and “WS”) coming from the MOJO in case of digital reception
  - Five analogue inputs: for EXT1 to EXT4 and HDMI
  - Loudspeaker output path
  - Headphone output path
  - SCART-1 output path (RF)
  - SCART-2 output path (WYSIWYG = monitor).
- Digital audio signals coming from HDMI sources are fed to a digital-to-analogue converter and then fed to the MSP. In case of reception of digital TV signals, digital audio signals coming from the MOJO are directly fed to the MSP via the I2S\_DA\_IN1, I2S\_WS1 and I2S\_CL1 lines. This ensures a “true digital path”.

- The microprocessor (item 7311) controls the audio part with the following control lines:
- MUTEn: used to mute the Class D amplifiers
  - ANTI\_PLOP: used to detect any DC failure in the Class D amplifiers
  - DC\_PROT: used to detect any DC failure in the Class D amplifiers.

#### 9.8.2 Audio Amplifier

The audio amplifier is an integrated class-D amplifier (TDA8932T, item 7A01). It combines a good performance with a high efficiency, resulting in a big reduction in heat generation.

#### Principle

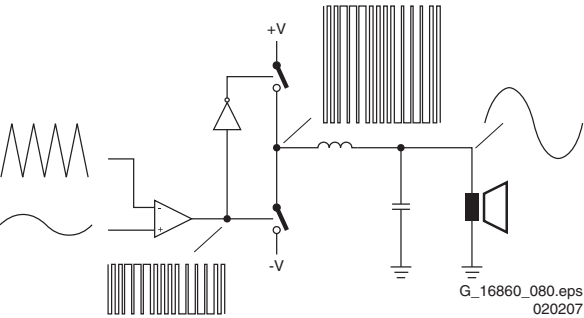


Figure 9-11 Principle Class-D Amplifier

The Class D amplifier works by varying the duty cycle of a Pulse Width Modulated (PWM) signal. By comparing the input voltage to a triangle wave, the amplifier increases duty cycle to increase output voltage, and decreases duty cycle to decrease output voltage. The output transistors of a Class D amplifier switch from ‘full off’ to ‘full on’ (saturated) and then back again, spending very little time in the linear region in between. Therefore, very little power is lost to heat. If the transistors have a low ‘on’ resistance (RDS(ON)), little voltage is dropped across them, further reducing losses. A Low Pass Filter at the output passes only the average of the output wave, which is an amplified version of the input signal. In order to keep the distortion low, negative feedback is applied.

The **advantage** of Class D is increased efficiency (= less heat dissipation). Class D amplifiers can drive the same output power as a Class AB amplifier using less supply current. The **disadvantage** is the large output filter. The main reason for this filter is that the switching waveform results in maximum current flow. This causes more loss in the load, which causes lower efficiency. An LC filter with a cut-off frequency less than the Class D switching frequency, allows the switching current to flow through the filter instead of the load, thus reducing the overall loss and increasing the efficiency.

#### DC-protection

A DC-detection circuit is foreseen to protect the speakers. It is built around three transistors (items 7A05 to 7A07) and generates a protection signal (DC\_PROT) to the microprocessor in case of a DC failure in the Class D amplifiers.

## 9.9 HDMI

### 9.9.1 Introduction

**Note:** Text below is an excerpt from the "HDMI Specification" that is issued by the HDMI founders (see <http://www.hdmi.org>).

The High-Definition Multimedia Interface is developed for transmitting digital signals from audiovisual sources to television sets, projectors and other video displays. HDMI can carry high quality multi-channel audio data and can carry all standard and high-definition consumer electronics video formats. Content protection technology is available. HDMI can also carry control and status information in both directions.

HDMI is backward compatible with DVI (1.0). Compared with DVI, HDMI offers extra:

- YUV 4:4:4 (3 x 8-bit) or 4:2:2 (up to 2 x 12-bit), where DVI offers only RGB 4:4:4 (3 x 8 bit).
- Digital audio in CD quality (16-bit, 32/44.1/48 kHz), higher quality available (8 channels, 192 kHz).
- Remote control via CEC bus (Consumer Electronics Control): allows user to control all HDMI devices with the TV's remote control and menus.
- Smaller connector (SCART successor).
- Less cables: e.g. from 10 audio/9 video cables to 3 HDMI cables.

### 9.9.2 Implementation

The IC used is the Sil 9025 (Silicon Image) third generation HDMI receiver (item 7817 on the SSB) with following features:

- Dual HDMI input connector.
- Two EEPROMS to support EDID.
- HDMI audio.
- I<sup>2</sup>S output to DACs which operating freq. of 32 to 192 kHz.
- Integrated HDCP decryption engine.
- Built-in pre-programmed HDCP keys for copy protection.
- Colour space conversion RGB to YCbCr.
- "Hot Plug Reset" signal.

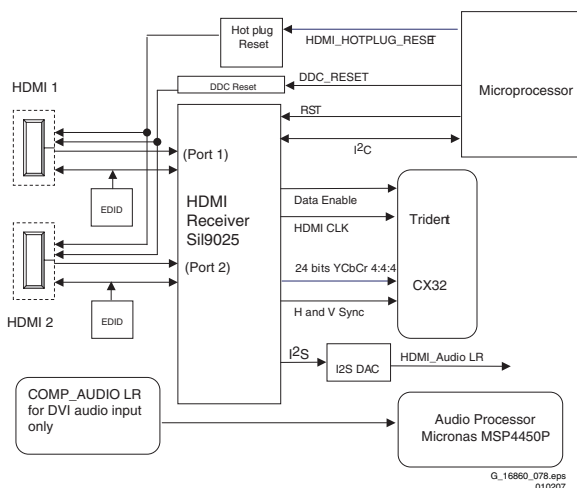


Figure 9-12 HDMI implementation

HDMI connectors 1 and 2 are connected to resp. ports 1 and 2 of the HDMI receiver. The ports cannot be activated at the same moment. Switching is controlled by software.

"Hot Plug Reset" and "DDC Reset" are controlled by the microprocessor.

The HDMI receiver will convert all RGB or YCbCr 4:2:2 signals to 24-bit YCbCr 4:4:4. When it receives a YCbCr 4:4:4 signal it will just pass the signal directly to the Trident Video Processor.

## 9.10 Abbreviation List

|              |                                                                                                                                             |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 1080i        | 1080 visible lines, interlaced                                                                                                              |
| 1080p        | 1080 visible lines, progressive scan                                                                                                        |
| 2CS          | 2 Carrier Sound                                                                                                                             |
| 2DNR         | Spatial (2D) Noise Reduction                                                                                                                |
| 3DNR         | Temporal (3D) Noise Reduction                                                                                                               |
| 480i         | 480 visible lines, interlaced                                                                                                               |
| 480p         | 480 visible lines, progressive scan                                                                                                         |
| AARA         | Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeping up the original aspect ratio |
| ACI          | Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page         |
| ADC          | analogue to Digital Converter                                                                                                               |
| AFC          | Automatic Frequency Control: control signal used to tune to the correct frequency                                                           |
| AGC          | Automatic Gain Control: algorithm that controls the video input of the feature box                                                          |
| AM           | Amplitude Modulation                                                                                                                        |
| AUO          | Acer Unipack Optonics                                                                                                                       |
| AP           | Asia Pacific                                                                                                                                |
| AR           | Aspect Ratio: 4 by 3 or 16 by 9                                                                                                             |
| ASD          | Automatic Standard Detection                                                                                                                |
| AV           | Audio Video                                                                                                                                 |
| B/G          | Monochrome TV system. Sound carrier distance is 5.5 MHz                                                                                     |
| BTSC         | Broadcast Television System Committee                                                                                                       |
| CAM          | Conditional Access Module                                                                                                                   |
| CBA          | Circuit Board Assembly (or PWB)                                                                                                             |
| CEC          | Consumer Electronics Control bus; remote control bus on HDMI connections                                                                    |
| CI           | Common Interface; E.g. PCMCIA slot for a CAM in a set top box                                                                               |
| CL           | Constant Level: audio output to connect with an external amplifier                                                                          |
| CLUT         | Colour Look Up Table                                                                                                                        |
| ComPair      | Computer aided rePair                                                                                                                       |
| COFDM        | Coded Orthogonal Frequency Division Multiplexing; A multiplexing technique that distributes the data to be transmitted over many carriers   |
| CSM          | Customer Service Mode                                                                                                                       |
| CVBS         | Composite Video Blanking and Synchronisation                                                                                                |
| CVBS-MON     | CVBS monitor signal                                                                                                                         |
| CVBS-TER-OUT | CVBS terrestrial out                                                                                                                        |
| CVI          | Component Video Input                                                                                                                       |
| DAC          | Digital to analogue Converter                                                                                                               |
| DBE          | Dynamic Bass Enhancement: extra low frequency amplification                                                                                 |
| DDC          | Display Data Channel; is a part of the "Plug and Play" feature                                                                              |
| DFU          | Directions For Use: owner's manual                                                                                                          |
| DNR          | Dynamic Noise Reduction                                                                                                                     |
| DRAM         | Dynamic RAM                                                                                                                                 |
| DSP          | Digital Signal Processing                                                                                                                   |
| DST          | Dealer Service Tool: special (European) remote control designed for service technicians                                                     |
| DTS          | Digital Theatre Sound                                                                                                                       |
| DVB(T)       | Digital Video Broadcast; An MPEG2 based standard for transmitting digital audio and video. T= Terrestrial                                   |
| DVD          | Digital Versatile Disc                                                                                                                      |
| DVI          | Digital Visual Interface                                                                                                                    |
| DW           | Double Window                                                                                                                               |

|             |                                                                                                                                                                                                                                                                                                                                                                                                              |            |                                                                                                                                                                                      |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ED          | Enhanced Definition: 480p, 576p                                                                                                                                                                                                                                                                                                                                                                              | NICAM      | Near Instantaneous Compounded                                                                                                                                                        |
| EDID        | Extended Display Identification Data (VESA standard)                                                                                                                                                                                                                                                                                                                                                         |            | Audio Multiplexing. This is a digital sound system, used mainly in Europe.                                                                                                           |
| EEPROM      | Electrically Erasable and Programmable Read Only Memory                                                                                                                                                                                                                                                                                                                                                      | NTSC       | National Television Standard Committee. Colour system used mainly in North America and Japan.                                                                                        |
| EU          | EUrope                                                                                                                                                                                                                                                                                                                                                                                                       |            | Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)                                                                 |
| EXT         | EXTERNAL (source), entering the set by SCART or by cinches (jacks)                                                                                                                                                                                                                                                                                                                                           |            |                                                                                                                                                                                      |
| FBL         | Fast Blanking: DC signal accompanying RGB signals                                                                                                                                                                                                                                                                                                                                                            |            |                                                                                                                                                                                      |
| FBL-TXT     | Fast Blanking Teletext                                                                                                                                                                                                                                                                                                                                                                                       | NVM        | Non Volatile Memory: IC containing TV related data (for example, options)                                                                                                            |
| FLASH       | FLASH memory                                                                                                                                                                                                                                                                                                                                                                                                 |            | Open Circuit                                                                                                                                                                         |
| FM          | Field Memory / Frequency Modulation                                                                                                                                                                                                                                                                                                                                                                          | O/C        | On/Off control signal for the LED                                                                                                                                                    |
| FMR         | FM Radio                                                                                                                                                                                                                                                                                                                                                                                                     | ON/OFF LED |                                                                                                                                                                                      |
| FRC         | Frame Rate Converter                                                                                                                                                                                                                                                                                                                                                                                         | OAD        | Over the Air Download                                                                                                                                                                |
| FTV         | Flat TeleVision                                                                                                                                                                                                                                                                                                                                                                                              | OSD        | On Screen Display                                                                                                                                                                    |
| H           | H_sync to the module                                                                                                                                                                                                                                                                                                                                                                                         | PAL        | Phase Alternating Line. Colour system used mainly in Western Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz) |
| HD          | High Definition: 720p, 1080i, 1080p                                                                                                                                                                                                                                                                                                                                                                          |            |                                                                                                                                                                                      |
| HDCP        | High-bandwidth Digital Content Protection; A "key" encoded into the HDMI/DVI signal that prevents video data piracy. If a source is HDCP coded and connected via HDMI/DVI without the proper HDCP decoding, the picture is put into a "snow vision" mode or changed to a low resolution. For normal content distribution, the source and the display device must be enabled for HDCP "software key" decoding | PC         | Personal Computer                                                                                                                                                                    |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | PCB        | Printed Circuit Board (or PWB)                                                                                                                                                       |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | PDP        | Plasma Display Panel                                                                                                                                                                 |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | PIG        | Picture In Graphic                                                                                                                                                                   |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | PIP        | Picture In Picture                                                                                                                                                                   |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | PLL        | Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency                                                                 |
| HDMI        | High Definition Multimedia Interface, digital audio and video interface                                                                                                                                                                                                                                                                                                                                      | PSU        | Power Supply Unit                                                                                                                                                                    |
| HP          | Head Phone                                                                                                                                                                                                                                                                                                                                                                                                   | PWB        | Printed Wiring Board (or PCB)                                                                                                                                                        |
| I           | Monochrome TV system. Sound carrier distance is 6.0 MHz                                                                                                                                                                                                                                                                                                                                                      | RAM        | Random Access Memory                                                                                                                                                                 |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | RC         | Remote Control transmitter                                                                                                                                                           |
| I2C         | Integrated IC bus                                                                                                                                                                                                                                                                                                                                                                                            | RC5 (6)    | Remote Control system 5 (6), the signal from the remote control receiver                                                                                                             |
| I2S         | Integrated IC Sound bus                                                                                                                                                                                                                                                                                                                                                                                      |            |                                                                                                                                                                                      |
| IBO(Z)      | Intelligent Bolt On module. Z= Zapper; module for DVB reception.                                                                                                                                                                                                                                                                                                                                             | RF         | Radio Frequency                                                                                                                                                                      |
| IC          | Integrated Circuit                                                                                                                                                                                                                                                                                                                                                                                           | RGB        | Red, Green, and Blue. The primary colour signals for TV. By mixing levels of R, G, and B, all colours (Y/C) are reproduced.                                                          |
| IF          | Intermediate Frequency                                                                                                                                                                                                                                                                                                                                                                                       |            |                                                                                                                                                                                      |
| IR          | Infra Red                                                                                                                                                                                                                                                                                                                                                                                                    |            |                                                                                                                                                                                      |
| IRQ         | Interrupt ReQuest                                                                                                                                                                                                                                                                                                                                                                                            | RGBHV      | Red, Green, Blue, Horizontal sync, and Vertical sync                                                                                                                                 |
| Last Status | The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according the customers wishes                                                                                                                                                                                                                                     | ROM        | Read Only Memory                                                                                                                                                                     |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | SAM        | Service Alignment Mode                                                                                                                                                               |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | SC         | SandCastle: two-level pulse derived from sync signals                                                                                                                                |
| LATAM       | LATIn America                                                                                                                                                                                                                                                                                                                                                                                                | SC1-OUT    | SCART output of the MSP audio IC                                                                                                                                                     |
| LC07        | Philips chassis name for LCD TV 2007 project                                                                                                                                                                                                                                                                                                                                                                 | SC2-OUT    | SCART output of the MSP audio IC                                                                                                                                                     |
| LCD         | Liquid Crystal Display                                                                                                                                                                                                                                                                                                                                                                                       | S/C        | Short Circuit                                                                                                                                                                        |
| LED         | Light Emitting Diode                                                                                                                                                                                                                                                                                                                                                                                         | SCL        | Clock signal on I2C bus                                                                                                                                                              |
| L/L'        | Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I                                                                                                                                                                                                                                                                                                      | SD         | Standard Definition: 480i, 576i                                                                                                                                                      |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | SDA        | Data signal on I2C bus                                                                                                                                                               |
| LPL         | LG Philips LCD                                                                                                                                                                                                                                                                                                                                                                                               | SDI        | Samsung Display Industry                                                                                                                                                             |
| LS          | Loud Speaker                                                                                                                                                                                                                                                                                                                                                                                                 | SDM        | Service Default Mode                                                                                                                                                                 |
| LVDS        | Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.                                                                                                                                                                                                                                                                                                      | SDRAM      | Synchronous DRAM                                                                                                                                                                     |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | SECAM      | SEquence Couleur Avec Memoire. Colour system used mainly in France and Eastern Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz                                               |
| M/N         | Monochrome TV system. Sound carrier distance is 4.5 MHz                                                                                                                                                                                                                                                                                                                                                      | SIF        | Sound Intermediate Frequency                                                                                                                                                         |
| MOSFET      | Metal Oxide Semiconductor Field Effect Transistor                                                                                                                                                                                                                                                                                                                                                            | SMPS       | Switch Mode Power Supply                                                                                                                                                             |
| MPEG        | Motion Pictures Experts Group                                                                                                                                                                                                                                                                                                                                                                                | SND        | SouND                                                                                                                                                                                |
| MSP         | Multi-standard Sound Processor: ITT sound decoder                                                                                                                                                                                                                                                                                                                                                            | SOPS       | Self Oscillating Power Supply                                                                                                                                                        |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | S/PDIF     | Sony Philips Digital InterFace                                                                                                                                                       |
| MUTE        | MUTE Line                                                                                                                                                                                                                                                                                                                                                                                                    | SRAM       | Static RAM                                                                                                                                                                           |
| NAFTA       | North American Free Trade Association: Trade agreement between Canada, USA and Mexico                                                                                                                                                                                                                                                                                                                        | SSB        | Small Signal Board                                                                                                                                                                   |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | STBY       | Stand-by                                                                                                                                                                             |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | SVHS       | Super Video Home System                                                                                                                                                              |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | SW         | Sub Woofer / SoftWare / Switch                                                                                                                                                       |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | THD        | Total Harmonic Distortion                                                                                                                                                            |
| NC          | Not Connected                                                                                                                                                                                                                                                                                                                                                                                                | TXT        | TeleteXT                                                                                                                                                                             |
|             |                                                                                                                                                                                                                                                                                                                                                                                                              | uP         | Microprocessor                                                                                                                                                                       |

|         |                                                                                                              |
|---------|--------------------------------------------------------------------------------------------------------------|
| VL      | Variable Level out: processed audio output toward external amplifier                                         |
| VCR     | Video Cassette Recorder                                                                                      |
| VGA     | Video Graphics Array                                                                                         |
| WD      | Watch Dog                                                                                                    |
| WYSIWYR | What You See Is What You Record: record selection that follows main picture and sound                        |
| XTAL    | Quartz crystal                                                                                               |
| YPbPr   | Component video (Y= Luminance, Pb/Pr= Colour difference signals B-Y and R-Y, other amplitudes w.r.t. to YUV) |
| Y/C     | Video related signals: Y consists of luminance signal, blanking level and sync; C consists of colour signal. |
| Y-OUT   | Luminance-signal                                                                                             |
| YUV     | Baseband component video (Y= Luminance, U/V= Colour difference signals)                                      |

9.11 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

9.11.1 Diagram B03B, Type TDA10046AHT (IC7F01), COFDM Channel Decoder

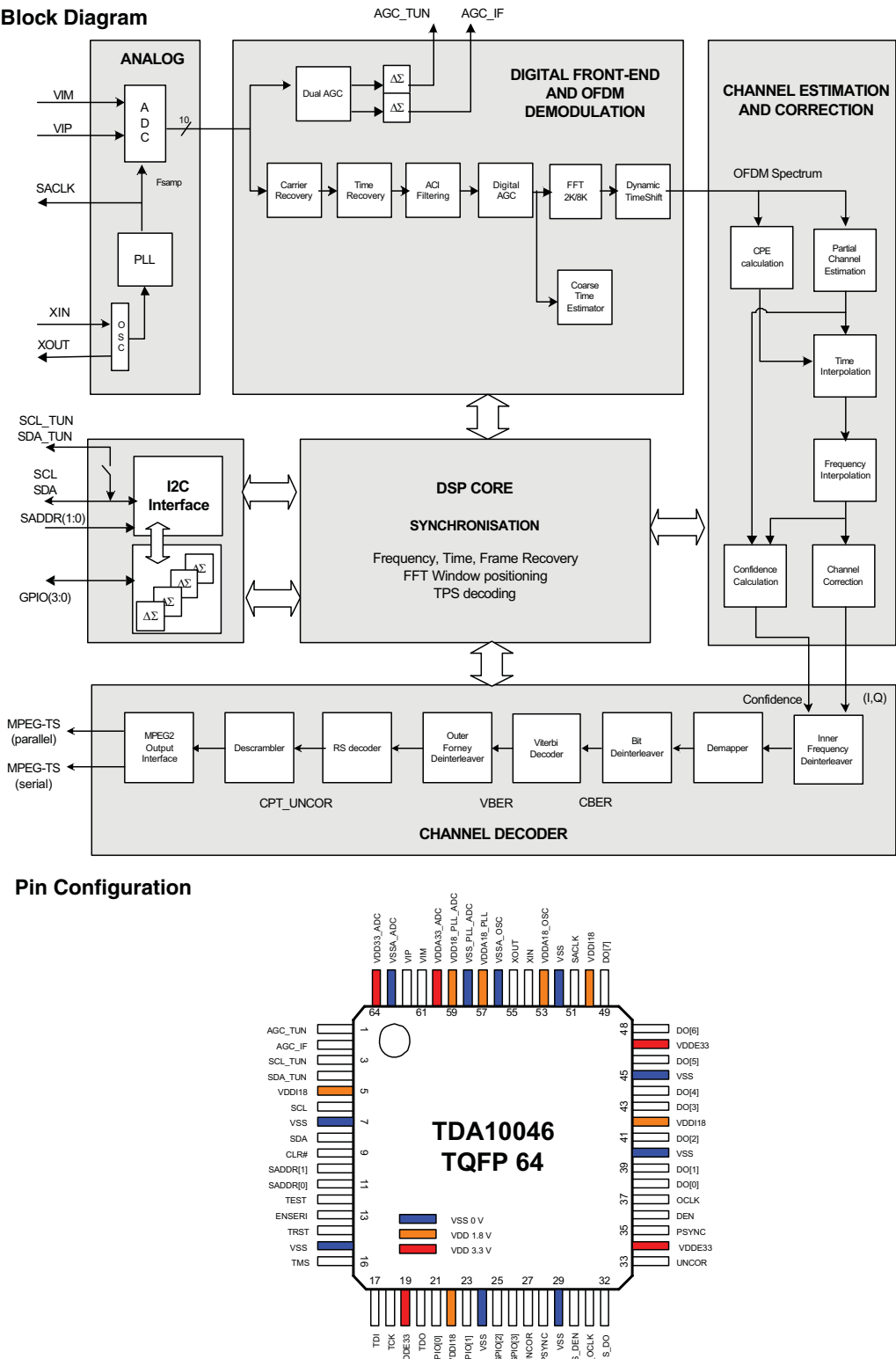
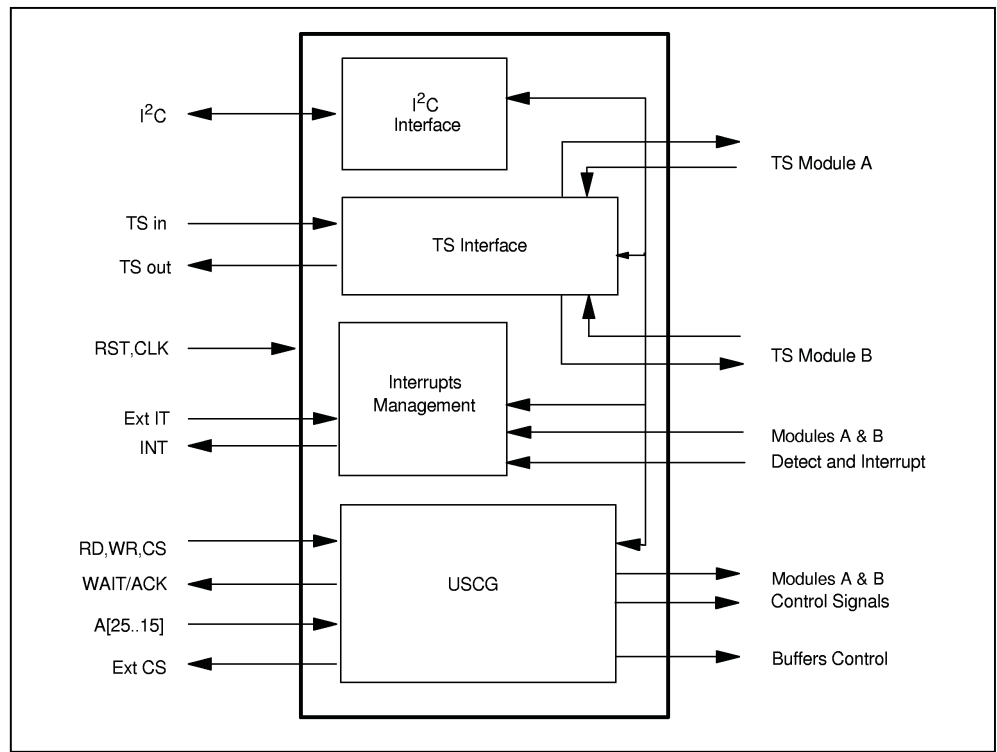


Figure 9-13 Internal block diagram and pin configuration

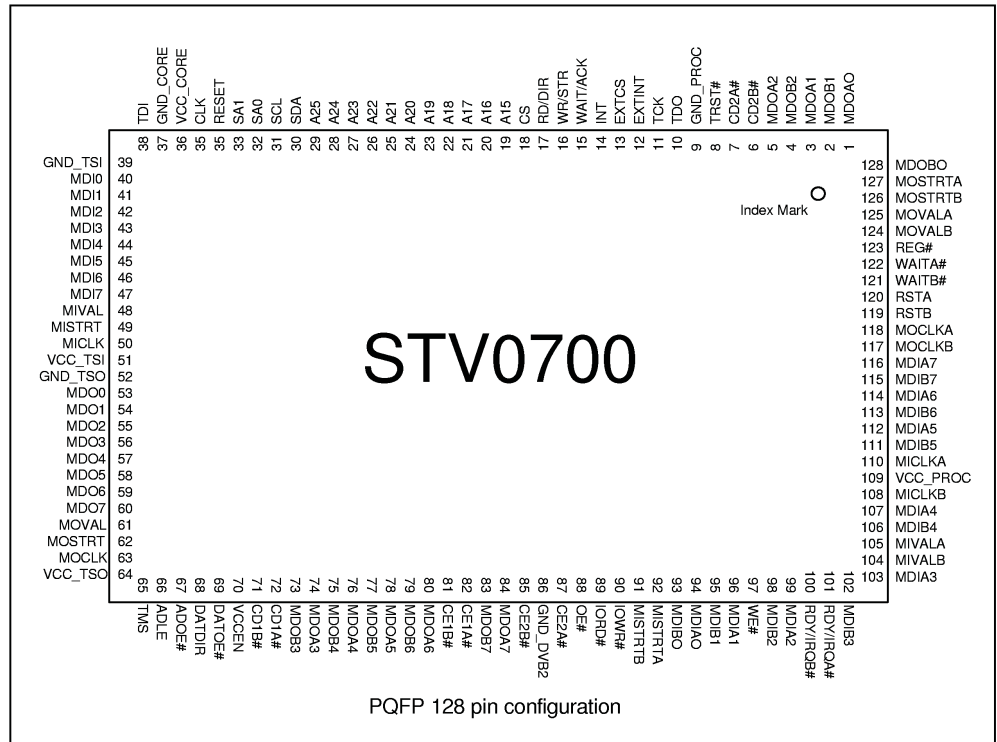


9.11.2 Diagram B03C, Type STV0700 (IC7K00), PCMCIA Controller

Block Diagram



Pin Configuration



H\_16861\_001.eps  
060307

Figure 9-14 Internal block diagram and pin configuration

9.11.3 Diagram B03D, Type PNX8314HS (IC7G00), DVB-MOJO

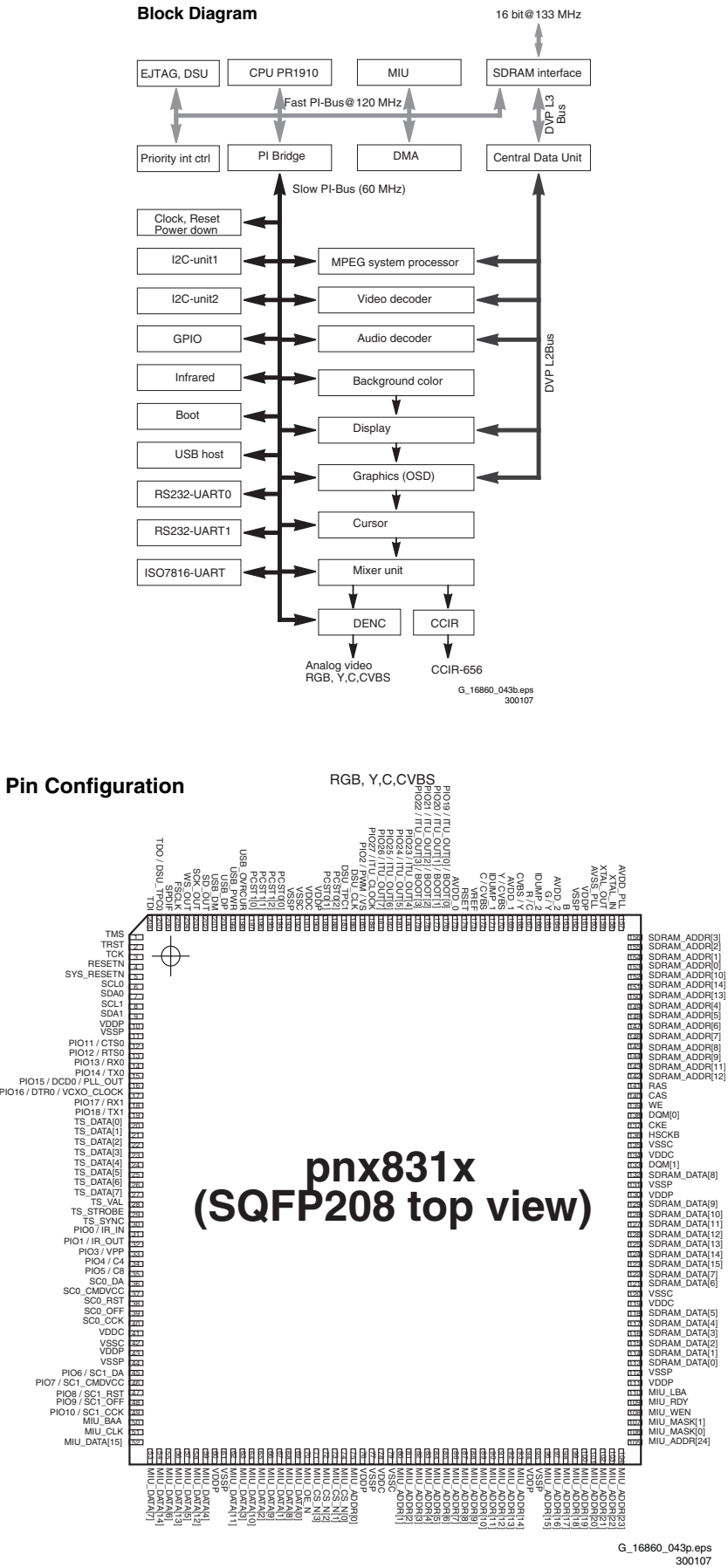
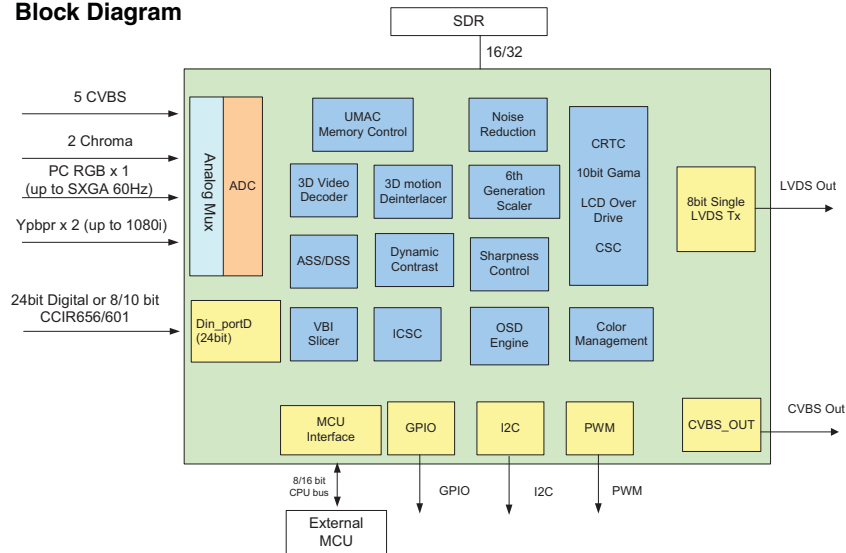


Figure 9-15 Internal block diagram and pin configuration

## 9.11.4 Diagram B04B, Type SVP CX32 (IC7202), Trident Video processor

## Block Diagram



## Pin Configuration

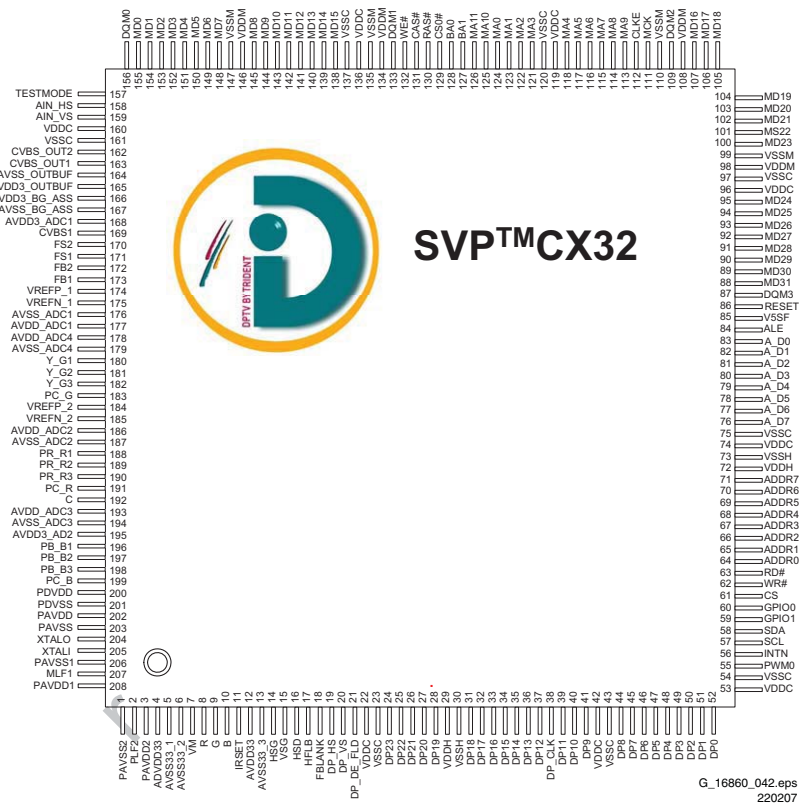


Figure 9-16 Internal block diagram and pin configuration

## 9.11.5 Diagram B04C, Type MSP4450P (IC7411), Micronas Sound Processor

Block Diagram

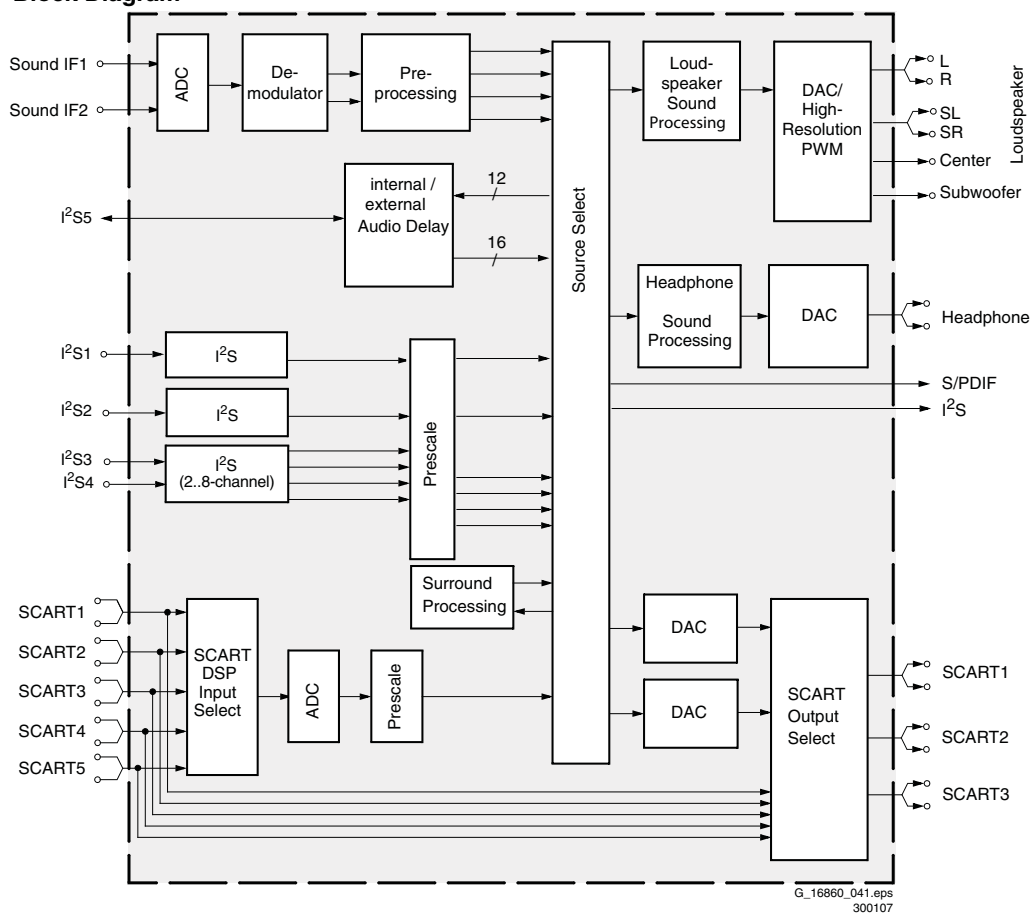


Figure 9-17 Internal block diagram

9.11.6 Diagram B06C, Type SIL9025CTU(IC7817), HDMI Receiver

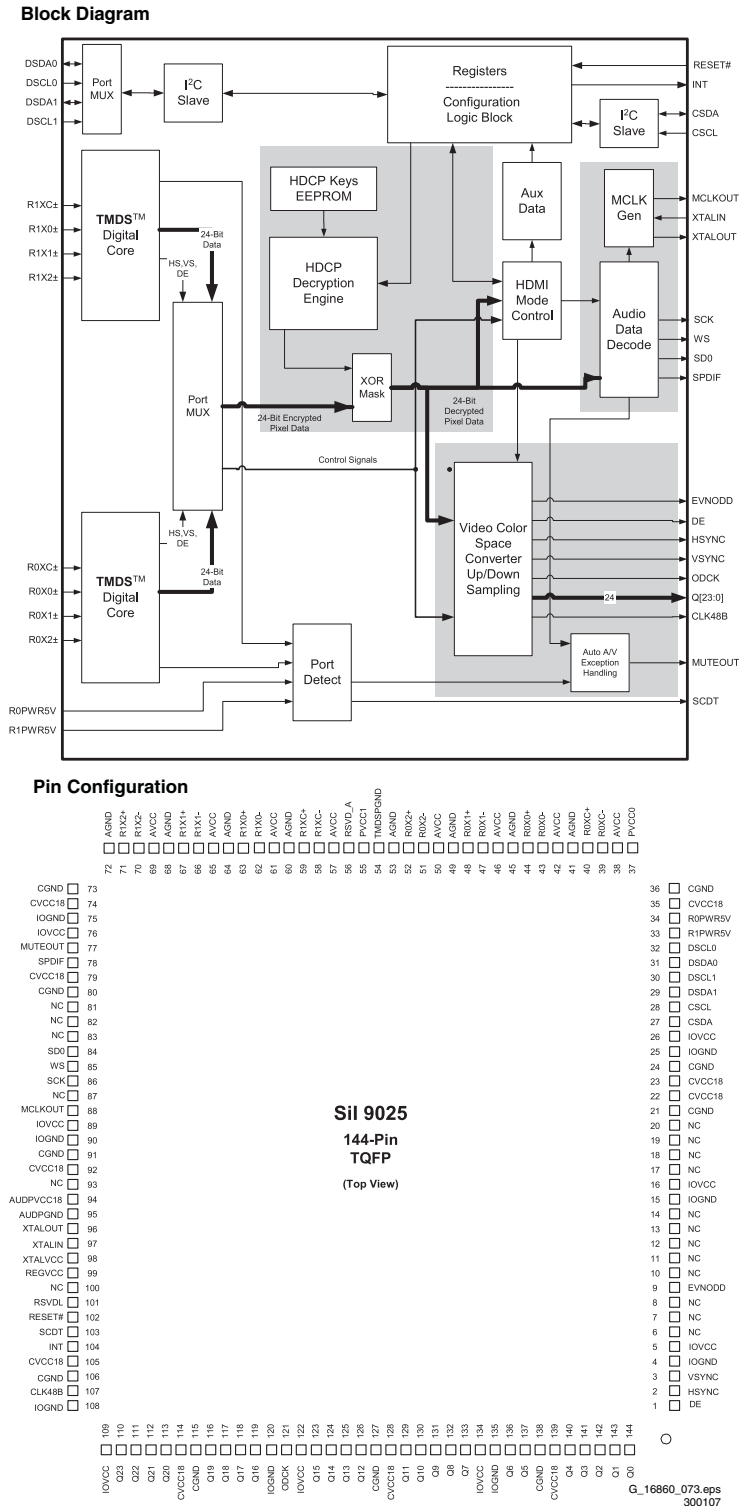
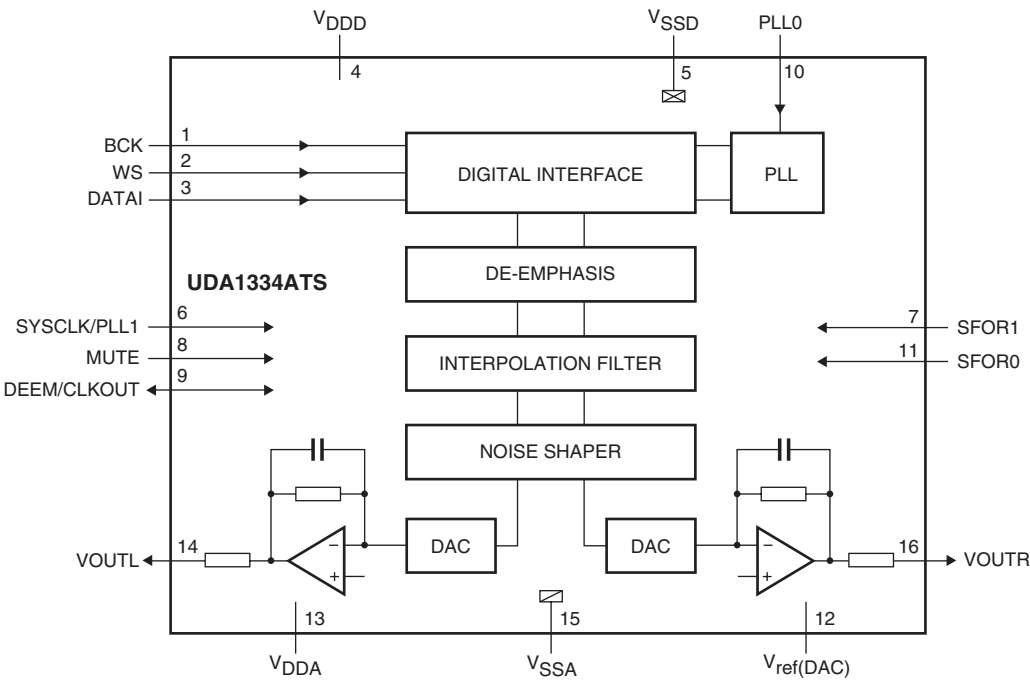


Figure 9-18 Internal block diagram and pin configuration

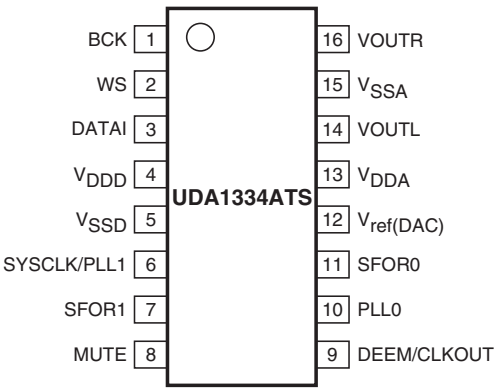


9.11.7 Diagram B06C, Type UDA1334ATS (IC7810), Audio DAC

Block Diagram



Pin Configuration

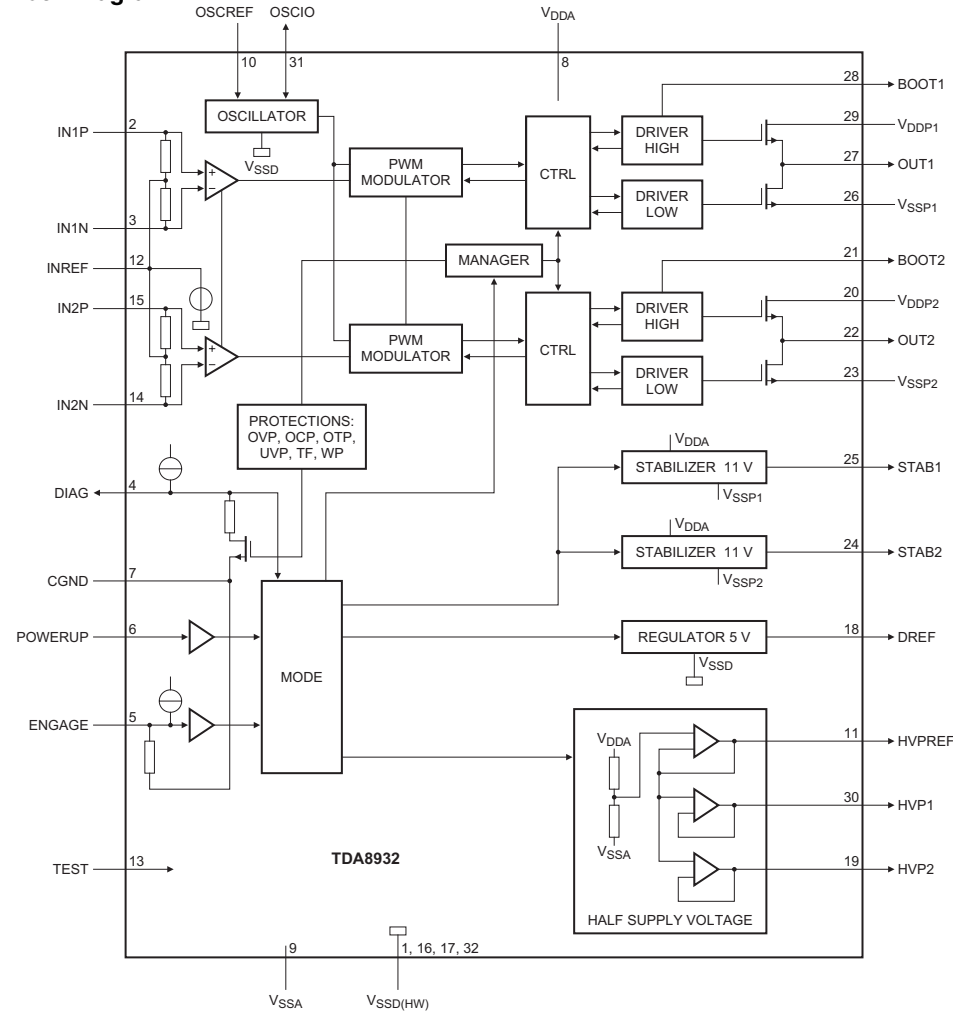


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220207

Figure 9-19 Internal block diagram and pin configuration

9.11.8 Diagram B07, Type TDA8932T (IC7A01), Audio Amplifier

Block Diagram



Pin Configuration

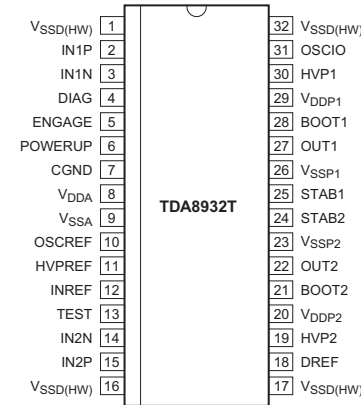


Figure 9-20 Internal block diagram and pin configuration

## 10. Spare Parts List

### Set Level per Model Number (CTN)

**42PFP5532D/05**

|       |                |                       |
|-------|----------------|-----------------------|
| 0815  | Proc. main SW  | Download from website |
| 0816  | Proc. NVM SW   | Download from website |
| 0821  | HDMI-1 SW      | Download from website |
| 0822  | HDMI-2 SW      | Download from website |
| 0851  | IBOZ main SW   | Download from website |
| 0852  | IBOZ NVM SW    | Download from website |
| 1004▲ | 9322 246 76682 | PDP PP42AX021A        |
| 1062  | 2422 549 00148 | Socket 3p m           |
| 1112  | 3139 268 05931 | IR/LED Assy [J]       |
| 1114  | 3139 268 05921 | Keyboard Assy [E]     |
| 8304  | 3139 131 09291 | Cable 11p/820/11p f   |
| 8321  | 3104 311 08731 | Cable Posi/100/posi   |
| 8735  | 3139 131 08731 | Cable 4p/480 1200/2ft |
| 8C01  | 3139 131 09321 | Cable 9p/280/9p       |
| 8G51  | 3139 131 09251 | Cable 30p/280/31p     |
| 8M01  | 3104 311 12721 | Cable p/120/3p Wh     |
| 8M20  | 3139 131 08762 | Cable 7p/680/7p       |
| 8P11  | 3139 131 09341 | Cable 8p/280/8p       |

|      |                |                            |
|------|----------------|----------------------------|
| 5213 | 2422 264 00612 | Loudsp. 12 $\Omega$ 15W FR |
| 5215 | 2422 264 00606 | Loudsp. 12 $\Omega$ 15W Tw |

**42PFP5532D/12**

|       |                |                       |
|-------|----------------|-----------------------|
| 0815  | Proc. main SW  | Download from website |
| 0816  | Proc. NVM SW   | Download from website |
| 0821  | HDMI-1 SW      | Download from website |
| 0822  | HDMI-2 SW      | Download from website |
| 0851  | IBOZ main SW   | Download from website |
| 0852  | IBOZ NVM SW    | Download from website |
| 1004▲ | 9322 246 76682 | PDP PP42AX021A        |
| 1062  | 2422 549 00148 | Socket 3p m           |
| 1112  | 3139 268 05931 | IR/LED Assy [J]       |
| 1114  | 3139 268 05921 | Keyboard Assy [E]     |
| 8304  | 3139 131 09291 | Cable11p/820/11p f    |
| 8321  | 3104 311 08731 | Cable Posi/100/posi   |
| 8735  | 3139 131 08731 | Cable 4p/480 1200/2ft |
| 8C01  | 3139 131 09321 | Cable 9p/280/9p       |
| 8G51  | 3139 131 09251 | Cable 30p/280/31p     |
| 8M01  | 3104 311 12721 | Cable p/120/3p Wh     |
| 8M20  | 3139 131 08762 | Cable 7p/680/7p       |
| 8P11  | 3139 131 09341 | Cable 8p/280/8p       |

|      |                |                    |
|------|----------------|--------------------|
| 5213 | 2422 264 00612 | Loudsp. 12Ω 15W FR |
| 5215 | 2422 264 00606 | Loudsp. 12Ω 15W Tw |

**50PFP5532D/05**

|       |                |                       |
|-------|----------------|-----------------------|
| 0815  | Proc. main SW  | Download from website |
| 0816  | Proc. NVM SW   | Download from website |
| 0821  | HDMI-1 SW      | Download from website |
| 0822  | HDMI-2 SW      | Download from website |
| 0851  | IBOZ main SW   | Download from website |
| 0852  | IBOZ NVM SW    | Download from website |
| 1004▲ | 9322 246 81682 | PDP S50HW-YD05        |
| 8304  | 3139 131 09311 | Cable 9p/340/9p       |
| 1112  | 3139 268 05931 | IR/LED Assy [J]       |
| 1114  | 3139 268 05921 | Keyboard Assy [E]     |
| 8304  | 3139 131 09291 | Cable11p/820/11p f    |
| 8735  | 3139 131 07991 | Cable 4p/820 1400/2ft |
| 8G51  | 3139 131 09241 | Cable 30p/340/31      |
| 8M01  | 3139 110 27651 | Cable 3p/100/3p       |
| 8M20  | 3139 131 09301 | Cable 7p/820/7p       |
| 8P11  | 3139 131 09331 | Cable 8p/340/8p       |

|      |                |                    |
|------|----------------|--------------------|
| 5213 | 2422 264 00612 | Loudsp. 12Ω 15W FR |
| 5215 | 2422 264 00606 | Loudsp. 12Ω 15W Tw |

**50PFP5532D/12**

|      |               |                       |
|------|---------------|-----------------------|
| 0815 | Proc. main SW | Download from website |
| 0816 | Proc. NVM SW  | Download from website |
| 0821 | HDMI-1 SW     | Download from website |
| 0822 | HDMI-2 SW     | Download from website |
| 0851 | IBOZ main SW  | Download from website |

|       |                |                       |
|-------|----------------|-----------------------|
| 0852  | IBOZ NVM SW    | Download from website |
| 1004▲ | 9322 246 81682 | PDP 350HW-YD05        |
| 1062  | 2422 549 00148 | Socket 3p m           |
| 1112  | 3139 268 05931 | IR/LED Assy [J]       |
| 1114  | 3139 268 05921 | Keyboard Assy [E]     |
| 8304  | 3139 131 09291 | Cable11p/820/11p f    |
| 8321  | 3104 311 08731 | Cable Posi/100/posi   |
| 8735  | 3139 131 07991 | Cable 4p/820 1400/2ft |
| 8C01  | 3139 131 09311 | Cable 9p/340/9p       |
| 8G51  | 3139 131 09241 | Cable 30p/340/31      |
| 8M01  | 3139 110 27651 | Cable 3p/100/3p       |
| 8M20  | 3139 131 09301 | Cable 7p/820/7p       |
| 8P11  | 3139 131 09331 | Cable 8p/340/8p       |

|      |                |                    |
|------|----------------|--------------------|
| 5213 | 2422 264 00612 | Loudsp. 12Ω 15W FR |
| 5215 | 2422 264 00606 | Loudsp. 12Ω 15W Tw |

### Small Signal Board [B]

## Various

|      |                |                        |
|------|----------------|------------------------|
| 1101 | 3112 297 14001 | Tuner TD1316AF/IHP-2   |
| 1102 | 9322 042 72682 | SAW 38.9MHz K3953M     |
| 1103 | 2422 549 44341 | SAW 38.9MHz K9656M     |
| 1104 | 2422 543 01386 | Xtal 4MHz 20p          |
| 1201 | 2422 543 01133 | Xtal 14.32MHz 20pF     |
| 1210 | 2422 549 45325 | Bead 67Ω at 100MHz     |
| 1211 | 2422 549 45325 | Bead 67Ω at 100MHz     |
| 1212 | 2422 549 45325 | Bead 67Ω at 100MHz     |
| 1213 | 2422 549 45325 | Bead 67Ω at 100MHz     |
| 1214 | 2422 549 45325 | Bead 67Ω at 100MHz     |
| 1215 | 2422 549 45325 | Bead 67Ω at 100MHz     |
| 1216 | 2422 549 45325 | Bead 67Ω at 100MHz     |
| 1301 | 2422 543 01526 | Xtal 10MHz 12p NX8045  |
| 1304 | 2422 025 10655 | Connector 11p m        |
| 1314 | 2422 025 18749 | Connector 3p m         |
| 1411 | 2422 543 01461 | Xtal 18.432MHz 12p     |
| 1504 | 4822 265 11338 | 21p (SCART)            |
| 1506 | 4822 265 11338 | 21p (SCART)            |
| 1615 | 2422 026 05894 | Socket CINC'H          |
| 1735 | 2422 025 09406 | Connector 4p m         |
| 1810 | 2422 033 00617 | Socket HDMI            |
| 1811 | 2422 033 00617 | Socket HDMI            |
| 1823 | 2422 543 01517 | Xtal 28M322 18p NX5032 |
| 1C01 | 2422 025 10769 | Connector 9p m         |
| 1G51 | 2422 025 18772 | Connector 30p m        |
| 1J14 | 2422 025 18749 | Connector 3p m         |
| 1K00 | 2422 025 20061 | Socket PCMCIA H        |
| 1M20 | 4822 267 10618 | Connector 7p           |
| 1P11 | 4822 265 11352 | Connector 8p           |

|      |                |                     |
|------|----------------|---------------------|
| 2112 | 2020 552 00343 | 22μF 10% 16V        |
| 2113 | 5322 126 11583 | 10nF 10% 50V 0603   |
| 2117 | 5322 126 11583 | 10nF 10% 50V 0603   |
| 2118 | 5322 126 11583 | 10nF 10% 50V 0603   |
| 2120 | 2020 552 00343 | 22μF 10% 16V        |
| 2121 | 3198 016 31590 | 15pF 10% 50V 0603   |
| 2122 | 3198 016 31590 | 15pF 10% 50V 0603   |
| 2123 | 4822 126 14247 | 1.5nF 50V 0603      |
| 2125 | 3198 017 44740 | 470nF 10V 0603      |
| 2126 | 3198 017 42240 | 220nF 16V Y5V 0603  |
| 2127 | 4822 122 33761 | 22pF 5% 50V         |
| 2128 | 5322 126 11583 | 10nF 10% 50V 0603   |
| 2129 | 2020 552 00343 | 22μF 10% 16V        |
| 2130 | 5322 126 11583 | 10nF 10% 50V 0603   |
| 2131 | 2020 552 00343 | 22μF 10% 16V        |
| 2132 | 2020 552 00343 | 22μF 10% 16V        |
| 2133 | 5322 126 11583 | 10nF 10% 50V 0603   |
| 2136 | 3198 017 44740 | 470nF 10V 0603      |
| 2137 | 5322 126 11583 | 10nF 10% 50V 0603   |
| 2138 | 5322 126 11583 | 10nF 10% 50V 0603   |
| 2139 | 4822 126 14315 | 390pF 5% 50V 0603   |
| 2143 | 5322 126 11578 | 1nF 10% 50V 0603    |
| 2144 | 5322 126 11583 | 10nF 10% 50V 0603   |
| 2145 | 5322 126 11578 | 1nF 10% 50V 0603    |
| 2146 | 3198 017 41050 | 1μF 10V 0603        |
| 2147 | 2238 786 19856 | 330nF 20% 160V 0603 |
| 2148 | 2238 586 59812 | 100nF 20% 50V 0603  |
| 2149 | 2020 552 00132 | 2.2μF 10% 10V       |
| 2211 | 2020 552 00291 | 10μF 20% 6V3 0603   |
| 2212 | 2238 586 59812 | 100nF 20% 50V 0603  |
| 2213 | 2238 586 59812 | 100nF 20% 50V 0603  |
| 2214 | 2238 586 59812 | 100nF 20% 50V 0603  |

|      |                |                    |
|------|----------------|--------------------|
| 2215 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2216 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2217 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2218 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2219 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2220 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2221 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2222 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2223 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2224 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2225 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2226 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2227 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2228 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2229 | 2020 552 00134 | 22μF 20% 6.3V 0805 |
| 2230 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2231 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2232 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2233 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2234 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2235 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2236 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2237 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2238 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2239 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2240 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2241 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2242 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2243 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2244 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2245 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2246 | 2020 552 96749 | 20pF 5% 50V 0603   |
| 2247 | 2020 552 96749 | 20pF 5% 50V 0603   |
| 2250 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2251 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2252 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2253 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2254 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2255 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2256 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2257 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2258 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2259 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2260 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2261 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2266 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2267 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2268 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2269 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2270 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2271 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2272 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2273 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2274 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2275 | 2238 586 15628 | 2.7nF 10% 50V 0603 |
| 2276 | 2238 586 15628 | 2.7nF 10% 50V 0603 |
| 2277 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2279 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2280 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2282 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2284 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2286 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2287 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2288 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2289 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2290 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2291 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2292 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2293 | 2020 552 00291 | 10μF 20% 6V3 0603  |
| 2295 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2296 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2297 | 2020 552 00134 | 22μF 20% 6.3V 0805 |
| 2298 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2310 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2311 | 2020 552 00291 | 10μF 20% 6V        |

|      |                |                    |      |                |                    |      |                |                    |
|------|----------------|--------------------|------|----------------|--------------------|------|----------------|--------------------|
| 2333 | 5322 126 11578 | 1nF 10% 50V 0603   | 2847 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F10 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2335 | 5322 126 11578 | 1nF 10% 50V 0603   | 2848 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F11 | 2020 012 93822 | 47µF 20% 16V       |
| 2336 | 5322 126 11578 | 1nF 10% 50V 0603   | 2849 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F12 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2337 | 5322 126 11578 | 1nF 10% 50V 0603   | 2850 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F13 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2338 | 4822 126 13879 | 220nF +80-20% 16V  | 2851 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F14 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2408 | 4822 126 13881 | 470pF 5% 50V       | 2852 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F15 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2409 | 4822 126 14247 | 1.5nF 50V 0603     | 2853 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F16 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2410 | 4822 124 23002 | 10µF 16V           | 2854 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F17 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2411 | 2020 552 00291 | 10µF 20% 6V3 0603  | 2855 | 3198 016 31020 | 1nF 25V 0603       | 2F18 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2412 | 4822 126 13883 | 220pF 5% 50V       | 2856 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F19 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2413 | 4822 126 13883 | 220pF 5% 50V       | 2857 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F20 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2414 | 2020 552 00291 | 10µF 20% 6V3 0603  | 2858 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F21 | 2020 012 93822 | 47µF 20% 16V       |
| 2415 | 3198 016 33380 | 3.3pF 50V 0603     | 2859 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F22 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2416 | 3198 016 33380 | 3.3pF 50V 0603     | 2860 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F23 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2417 | 4822 126 14241 | 330pF 0603 50V     | 2861 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F24 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2418 | 4822 126 14241 | 330pF 0603 50V     | 2865 | 3198 016 31020 | 1nF 25V 0603       | 2F25 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2419 | 2238 586 59812 | 100nF 20% 50V 0603 | 2866 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F26 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2420 | 4822 124 23002 | 10µF 16V           | 2867 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F27 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2421 | 4822 126 14241 | 330pF 0603 50V     | 2868 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F28 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2422 | 4822 126 14241 | 330pF 0603 50V     | 2869 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F29 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2423 | 4822 124 23002 | 10µF 16V           | 2870 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F30 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2424 | 2020 552 00291 | 10µF 20% 6V3 0603  | 2871 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F31 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2425 | 2020 552 00291 | 10µF 20% 6V3 0603  | 2872 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F32 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2426 | 2020 552 00291 | 10µF 20% 6V3 0603  | 2873 | 5322 126 11578 | 1nF 10% 50V 0603   | 2F33 | 4822 122 33741 | 10pF 10% 50V       |
| 2427 | 2020 552 00291 | 10µF 20% 6V3 0603  | 2874 | 3198 016 31020 | 1nF 25V 0603       | 2G02 | 4822 124 23002 | 10µF 16V           |
| 2428 | 2020 552 94427 | 100pF 5% 50V       | 2875 | 5322 126 11578 | 1nF 10% 50V 0603   | 2G03 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2429 | 2020 552 94427 | 100pF 5% 50V       | 2876 | 5322 126 11578 | 1nF 10% 50V 0603   | 2G04 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2430 | 2020 552 94427 | 100pF 5% 50V       | 2901 | 2020 552 96664 | 33pF 50V 0603      | 2G05 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2431 | 2020 552 94427 | 100pF 5% 50V       | 2902 | 3198 017 44740 | 470nF 10V 0603     | 2G06 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2432 | 4822 126 14225 | 56pF 5% 50V 0603   | 2903 | 4822 124 12095 | 100µF 20% 16V      | 2G07 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2433 | 4822 126 14241 | 330pF 0603 50V     | 2904 | 3198 017 44740 | 470nF 10V 0603     | 2G08 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2434 | 4822 126 14241 | 330pF 0603 50V     | 2905 | 2020 552 96664 | 33pF 50V 0603      | 2G09 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2435 | 4822 126 14241 | 330pF 0603 50V     | 2906 | 4822 124 12095 | 100µF 20% 16V      | 2G10 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2436 | 2020 552 00291 | 10µF 20% 6V3 0603  | 2907 | 3198 017 44740 | 470nF 10V 0603     | 2G11 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2437 | 2020 552 00291 | 10µF 20% 6V3 0603  | 2908 | 4822 126 13879 | 220nF +80-20% 16V  | 2G12 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2438 | 2238 586 59812 | 100nF 20% 50V 0603 | 2913 | 4822 126 13879 | 220nF +80-20% 16V  | 2G13 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2439 | 2020 552 00247 | 470nF 10% 25V      | 2940 | 4822 124 11131 | 47µF 6.3V          | 2G14 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2440 | 2020 552 00247 | 470nF 10% 25V      | 2A01 | 2238 586 59812 | 100nF 20% 50V 0603 | 2G15 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2441 | 4822 126 14247 | 1.5nF 50V 0603     | 2A02 | 2238 586 59812 | 100nF 20% 50V 0603 | 2G16 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2442 | 4822 126 13881 | 470pF 5% 50V       | 2A04 | 2020 021 00215 | 220µF 20% 25V      | 2G17 | 4822 124 23002 | 10µF 16V           |
| 2443 | 4822 126 14247 | 1.5nF 50V 0603     | 2A08 | 2020 021 00215 | 220µF 20% 25V      | 2G18 | 4822 124 23002 | 10µF 16V           |
| 2444 | 4822 126 13881 | 470pF 5% 50V       | 2A09 | 2238 586 59812 | 100nF 20% 50V 0603 | 2G19 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2445 | 2238 586 59812 | 100nF 20% 50V 0603 | 2A10 | 2238 586 59812 | 100nF 20% 50V 0603 | 2G20 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2502 | 4822 126 14241 | 330pF 0603 50V     | 2A11 | 2020 552 96807 | 1µF 10% 10V 0603   | 2G21 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2506 | 4822 126 14241 | 330pF 0603 50V     | 2A12 | 4822 126 13883 | 220pF 5% 50V       | 2G22 | 4822 124 23002 | 10µF 16V           |
| 2508 | 4822 126 14241 | 330pF 0603 50V     | 2A13 | 3198 017 42240 | 220nF 16V Y5V 0603 | 2G23 | 4822 124 23002 | 10µF 16V           |
| 2509 | 4822 126 13879 | 220nF +80-20% 16V  | 2A14 | 2020 552 00247 | 470nF 10% 25V      | 2G24 | 4822 124 23002 | 10µF 16V           |
| 2512 | 5322 126 11579 | 3.3nF 10% 63V      | 2A15 | 2020 552 96807 | 1µF 10% 10V 0603   | 2G32 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2514 | 4822 126 14241 | 330pF 0603 50V     | 2A16 | 2020 552 96807 | 1µF 10% 10V 0603   | 2G33 | 4822 124 23002 | 10µF 16V           |
| 2515 | 4822 126 13879 | 220nF +80-20% 16V  | 2A17 | 3198 016 31020 | 1nF 25V 0603       | 2H03 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2517 | 5322 126 11579 | 3.3nF 10% 63V      | 2A18 | 3198 016 31020 | 1nF 25V 0603       | 2H04 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2518 | 4822 126 13879 | 220nF +80-20% 16V  | 2A19 | 4822 126 13883 | 220pF 5% 50V       | 2H06 | 4822 124 23002 | 10µF 16V           |
| 2520 | 5322 126 11579 | 3.3nF 10% 63V      | 2A20 | 2020 552 96807 | 1µF 10% 10V 0603   | 2H07 | 4822 124 23002 | 10µF 16V           |
| 2521 | 4822 126 13879 | 220nF +80-20% 16V  | 2A21 | 3198 016 31020 | 1nF 25V 0603       | 2H08 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2523 | 5322 126 11579 | 3.3nF 10% 63V      | 2A22 | 2238 586 59812 | 100nF 20% 50V 0603 | 2H09 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2525 | 4822 126 13879 | 220nF +80-20% 16V  | 2A23 | 3198 016 31020 | 1nF 25V 0603       | 2H10 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2533 | 4822 126 13879 | 220nF +80-20% 16V  | 2A24 | 2238 586 59812 | 100nF 20% 50V 0603 | 2H11 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2534 | 4822 126 13879 | 220nF +80-20% 16V  | 2A25 | 3198 017 31530 | 15nF 20% 50V 0603  | 2H12 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2536 | 4822 126 13879 | 220nF +80-20% 16V  | 2A26 | 3198 017 42240 | 220nF 16V Y5V 0603 | 2H13 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2607 | 4822 126 13879 | 220nF +80-20% 16V  | 2A27 | 3198 017 31530 | 15nF 20% 50V 0603  | 2H14 | 4822 126 13879 | 220nF +80-20% 16V  |
| 2608 | 5322 126 11579 | 3.3nF 10% 63V      | 2A28 | 2020 552 00247 | 470nF 10% 25V      | 2H15 | 4822 126 13879 | 220nF +80-20% 16V  |
| 2610 | 4822 126 13879 | 220nF +80-20% 16V  | 2A29 | 2238 586 59812 | 100nF 20% 50V 0603 | 2J01 | 4822 124 23002 | 10µF 16V           |
| 2612 | 5322 126 11579 | 3.3nF 10% 63V      | 2A30 | 2238 586 59812 | 100nF 20% 50V 0603 | 2J02 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2801 | 4822 124 11131 | 47µF 6.3V          | 2A31 | 3198 016 31020 | 1nF 25V 0603       | 2J04 | 5322 124 41945 | 22µF 20% 35V       |
| 2802 | 2238 586 59812 | 100nF 20% 50V 0603 | 2A32 | 3198 016 31020 | 1nF 25V 0603       | 2J05 | 4822 124 12095 | 100µF 20% 16V      |
| 2803 | 2238 586 59812 | 100nF 20% 50V 0603 | 2A33 | 2238 586 59812 | 100nF 20% 50V 0603 | 2J06 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2804 | 2238 586 59812 | 100nF 20% 50V 0603 | 2A34 | 2238 586 59812 | 100nF 20% 50V 0603 | 2J62 | 3198 016 36890 | 68pF 50V 0603      |
| 2805 | 4822 124 11131 | 47µF 6.3V          | 2A35 | 3198 016 31020 | 1nF 25V 0603       | 2J63 | 4822 126 14508 | 180pF 5% 50V 0603  |
| 2806 | 2238 586 59812 | 100nF 20% 50V 0603 | 2A36 | 3198 016 31020 | 1nF 25V 0603       | 2J66 | 4822 126 14508 | 180pF 5% 50V 0603  |
| 2807 | 2238 586 59812 | 100nF 20% 50V 0603 | 2A37 | 3198 017 42240 | 220nF 16V Y5V 0603 | 2J67 | 3198 016 36890 | 68pF 50V 0603      |
| 2808 | 4822 124 11131 | 47µF 6.3V          | 2A38 | 3198 017 42240 | 220nF 16V Y5V 0603 | 2J69 | 4822 126 14508 | 180pF 5% 50V 0603  |
| 2809 | 5322 126 11583 | 10nF 10% 50V 0603  | 2A40 | 2020 552 00247 | 470nF 10% 25V      | 2J70 | 3198 016 36890 | 68pF 50V 0603      |
| 2810 | 5322 126 11583 | 10nF 10% 50V 0603  | 2A41 | 2020 552 96807 | 1µF 10% 10V 0603   | 2J72 | 4822 126 14508 | 180pF 5% 50V 0603  |
| 2811 | 2020 552 00291 | 10µF 20% 6V3 0603  | 2A45 | 3198 016 31020 | 1nF 25V 0603       | 2J73 | 3198 016 36890 | 68pF 50V 0603      |
| 2812 | 2020 552 00291 | 10µF 20% 6V3 0603  | 2A46 | 3198 024 44730 | 47nF 50V 0603      | 2K00 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2813 | 4822 126 14507 | 18pF 5% 50V 0603   | 2A47 | 3198 024 44730 | 47nF 50V 0603      | 2K01 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2814 | 5322 126 11583 | 10nF 10% 50V 0603  | 2B10 | 4822 124 12095 | 100µF 20% 16V      | 2K02 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2815 | 5322 126 11583 | 10nF 10% 50V 0603  | 2B11 | 5322 126 11583 | 10nF 10% 50V 0603  | 2K03 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2816 | 5322 126 11578 | 1nF 10% 50V 0603   | 2B12 | 2020 552 00343 | 22µF 10% 16V       | 2K04 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2817 | 2238 586 59812 | 100nF 20% 50V 0603 | 2B13 | 2022 031 00373 | 470µF 20% 16V      | 2K05 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2818 | 2238 586 59812 | 100nF 20% 50V 0603 | 2B14 | 4822 126 13883 | 220pF 5% 50V       | 2K06 | 4822 124 23002 | 10µF 16V           |
| 2819 | 2238 586 59812 | 100nF 20% 50V 0603 | 2B15 | 2238 916 15641 | 22nF 10% 25V 0603  | 2K07 | 4822 124 23002 | 10µF 16V           |
| 2828 | 4822 126 14507 | 18pF 5% 50V 06     |      |                |                    |      |                |                    |

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|      |                |                      |      |                |                     |      |                |                     |
|------|----------------|----------------------|------|----------------|---------------------|------|----------------|---------------------|
| 3110 | 3198 021 38220 | 8.2kΩ 5% 0.062W 0603 | 3370 | 4822 051 30101 | 100Ω 5% 0.062W      | 3811 | 4822 051 30472 | 4.7Ω 5% 0.062W      |
| 3111 | 4822 051 30562 | 5.6kΩ 5% 0.063W 0603 | 3372 | 4822 051 30472 | 4.7Ω 5% 0.062W      | 3815 | 4822 051 30105 | 1MΩ 5% 0.062W       |
| 3115 | 4822 051 30393 | 39kΩ 5% 0.062W       | 3373 | 4822 051 30101 | 100Ω 5% 0.062W      | 3819 | 4822 051 30339 | 33Ω 5% 0.062W       |
| 3116 | 4822 051 30682 | 6.8Ω 5% 0.062W       | 3375 | 4822 051 30472 | 4.7Ω 5% 0.062W      | 3828 | 4822 051 30472 | 4.7Ω 5% 0.062W      |
| 3117 | 4822 051 30222 | 2.2kΩ 5% 0.062W      | 3377 | 4822 051 30332 | 3.3Ω 5% 0.062W      | 3830 | 4822 051 30472 | 4.7Ω 5% 0.062W      |
| 3118 | 4822 051 30222 | 2.2kΩ 5% 0.062W      | 3378 | 4822 051 30101 | 100Ω 5% 0.062W      | 3831 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3119 | 4822 051 30223 | 22kΩ 5% 0.062W       | 3379 | 4822 051 30332 | 3.3Ω 5% 0.062W      | 3832 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3120 | 2422 549 42896 | Bead 120Ω 100MHz     | 3380 | 4822 051 30101 | 100Ω 5% 0.062W      | 3833 | 4822 051 30472 | 4.7Ω 5% 0.062W      |
| 3121 | 2422 549 42896 | Bead 120Ω 100MHz     | 3381 | 3198 021 32290 | 22Ω 5% 0603         | 3834 | 4822 051 30472 | 4.7Ω 5% 0.062W      |
| 3122 | 4822 051 30183 | 18kΩ 5% 0.062W       | 3382 | 4822 051 30101 | 100Ω 5% 0.062W      | 3835 | 4822 051 30339 | 33Ω 5% 0.062W       |
| 3123 | 4822 051 30151 | 150Ω 5% 0.062W       | 3383 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 | 3846 | 4822 051 30472 | 4.7Ω 5% 0.062W      |
| 3124 | 4822 051 30101 | 100Ω 5% 0.062W       | 3384 | 3198 021 32290 | 22Ω 5% 0603         | 3850 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3125 | 4822 051 30151 | 150Ω 5% 0.062W       | 3385 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 | 3851 | 3198 031 13390 | 4 x 33Ω 5% 1206     |
| 3126 | 4822 051 30181 | 180Ω 5% 0.062W       | 3386 | 4822 051 30101 | 100Ω 5% 0.062W      | 3852 | 3198 031 13390 | 4 x 33Ω 5% 1206     |
| 3127 | 4822 051 30562 | 5.6kΩ 5% 0.063W 0603 | 3387 | 4822 051 30101 | 100Ω 5% 0.062W      | 3853 | 3198 031 13390 | 4 x 33Ω 5% 1206     |
| 3128 | 4822 051 30101 | 100Ω 5% 0.062W       | 3388 | 4822 051 30101 | 100Ω 5% 0.062W      | 3854 | 3198 031 13390 | 4 x 33Ω 5% 1206     |
| 3129 | 4822 051 30101 | 100Ω 5% 0.062W       | 3389 | 4822 051 30479 | 47Ω 5% 0.062W       | 3855 | 3198 031 13390 | 4 x 33Ω 5% 1206     |
| 3133 | 4822 117 11151 | 1Ω 5%                | 3390 | 4822 051 30479 | 47Ω 5% 0.062W       | 3856 | 3198 031 13390 | 4 x 33Ω 5% 1206     |
| 3134 | 4822 117 11151 | 1Ω 5%                | 3391 | 4822 051 30479 | 47Ω 5% 0.062W       | 3857 | 4822 051 30339 | 33Ω 5% 0.062W       |
| 3135 | 4822 117 12971 | 15Ω 5% 0603 0.62W    | 3393 | 4822 051 30153 | 15kΩ 5% 0.062W      | 3858 | 4822 051 30339 | 33Ω 5% 0.062W       |
| 3136 | 2322 762 60479 | 47Ω 5% 2512          | 3394 | 4822 051 30223 | 22kΩ 5% 0.062W      | 3859 | 4822 051 30339 | 33Ω 5% 0.062W       |
| 3137 | 2322 762 60479 | 47Ω 5% 2512          | 3395 | 4822 051 30152 | 1.5Ω 5% 0.062W      | 3860 | 4822 051 30339 | 33Ω 5% 0.062W       |
| 3201 | 3198 031 11010 | 4 x 100Ω 5% 1206     | 3396 | 4822 051 30102 | 1kΩ 5% 0.062W       | 3862 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3202 | 3198 031 11010 | 4 x 100Ω 5% 1206     | 3397 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 | 3863 | 4822 051 30222 | 2.2kΩ 5% 0.062W     |
| 3203 | 4822 117 13523 | 220Ω 5% 0.63W        | 3398 | 4822 117 13632 | 100kΩ 1% 0603 0.62W | 3864 | 4822 051 30101 | 100Ω 5% 0.062W      |
| 3204 | 4822 117 13523 | 220Ω 5% 0.63W        | 3399 | 4822 051 30103 | 10kΩ 5% 0.062W      | 3877 | 4822 051 30222 | 2.2kΩ 5% 0.062W     |
| 3211 | 4822 051 30102 | 1kΩ 5% 0.062W        | 3402 | 4822 117 11151 | 1Ω 5%               | 3880 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3212 | 4822 051 30101 | 100Ω 5% 0.062W       | 3410 | 4822 051 30101 | 100Ω 5% 0.062W      | 3881 | 4822 051 30222 | 2.2kΩ 5% 0.062W     |
| 3215 | 4822 051 30101 | 100Ω 5% 0.062W       | 3411 | 4822 051 30101 | 100Ω 5% 0.062W      | 3882 | 4822 051 30101 | 100Ω 5% 0.062W      |
| 3221 | 4822 051 30472 | 4.7Ω 5% 0.062W       | 3417 | 4822 051 30101 | 100Ω 5% 0.062W      | 3883 | 4822 051 30222 | 2.2kΩ 5% 0.062W     |
| 3222 | 4822 051 30472 | 4.7Ω 5% 0.062W       | 3418 | 4822 051 30101 | 100Ω 5% 0.062W      | 3896 | 4822 051 30101 | 100Ω 5% 0.062W      |
| 3227 | 4822 051 30101 | 100Ω 5% 0.062W       | 3419 | 4822 051 30101 | 100Ω 5% 0.062W      | 3897 | 4822 051 30101 | 100Ω 5% 0.062W      |
| 3233 | 4822 051 30101 | 100Ω 5% 0.062W       | 3420 | 4822 051 30101 | 100Ω 5% 0.062W      | 3901 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3235 | 4822 051 30101 | 100Ω 5% 0.062W       | 3500 | 4822 051 30151 | 150Ω 5% 0.062W      | 3902 | 4822 051 30124 | 120kΩ 5% 0.062W     |
| 3238 | 4822 051 30101 | 100Ω 5% 0.062W       | 3502 | 4822 051 30151 | 150Ω 5% 0.062W      | 3904 | 4822 051 30339 | 33Ω 5% 0.062W       |
| 3239 | 4822 051 30101 | 100Ω 5% 0.062W       | 3503 | 4822 051 30151 | 150Ω 5% 0.062W      | 3905 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3244 | 3198 021 32290 | 22Ω 5% 0603          | 3506 | 4822 051 30151 | 150Ω 5% 0.062W      | 3906 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3248 | 3198 021 32290 | 22Ω 5% 0603          | 3507 | 4822 051 30151 | 150Ω 5% 0.062W      | 3907 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3260 | 2350 035 10229 | 4 x 22Ω 5% 1206      | 3508 | 4822 051 30333 | 33kΩ 5% 0.062W      | 3908 | 4822 051 30124 | 120kΩ 5% 0.062W     |
| 3261 | 2350 035 10229 | 4 x 22Ω 5% 1206      | 3510 | 4822 051 30151 | 150Ω 5% 0.062W      | 3910 | 4822 051 30339 | 33Ω 5% 0.062W       |
| 3262 | 2350 035 10229 | 4 x 22Ω 5% 1206      | 3511 | 4822 051 30333 | 33kΩ 5% 0.062W      | 3911 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3263 | 2350 035 10229 | 4 x 22Ω 5% 1206      | 3512 | 4822 051 30151 | 150Ω 5% 0.062W      | 3912 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3264 | 2350 035 10229 | 4 x 22Ω 5% 1206      | 3513 | 4822 051 30333 | 33kΩ 5% 0.062W      | 3913 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3265 | 2350 035 10229 | 4 x 22Ω 5% 1206      | 3514 | 4822 051 30151 | 150Ω 5% 0.062W      | 3914 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3266 | 3198 021 32290 | 22Ω 5% 0603          | 3515 | 4822 051 30333 | 33kΩ 5% 0.062W      | 3915 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3267 | 3198 021 32290 | 22Ω 5% 0603          | 3516 | 4822 051 30101 | 100Ω 5% 0.062W      | 3916 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3268 | 2350 035 10229 | 4 x 22Ω 5% 1206      | 3517 | 4822 051 30759 | 75Ω 5% 0.062W       | 3917 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3271 | 2350 035 10229 | 4 x 22Ω 5% 1206      | 3518 | 4822 051 30273 | 27kΩ 5% 0.062W      | 3918 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3300 | 4822 117 11817 | 1.2kΩ 1% 0.0625W     | 3519 | 4822 117 12971 | 15Ω 5% 0603 0.62W   | 3934 | 4822 051 30472 | 4.7Ω 5% 0.062W      |
| 3303 | 4822 051 30101 | 100Ω 5% 0.062W       | 3520 | 4822 051 30682 | 6.8Ω 5% 0.062W      | 3935 | 4822 051 30472 | 4.7Ω 5% 0.062W      |
| 3305 | 4822 051 30332 | 3.3Ω 5% 0.062W       | 3521 | 4822 051 30102 | 1kΩ 5% 0.062W       | 3937 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3308 | 4822 051 30332 | 3.3Ω 5% 0.062W       | 3522 | 4822 051 30689 | 68Ω 5% 0.063W 0603  | 3938 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3310 | 4822 051 30102 | 1kΩ 5% 0.062W        | 3523 | 4822 051 30101 | 100Ω 5% 0.062W      | 3942 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3313 | 4822 051 30331 | 330Ω 5% 0.062W       | 3524 | 4822 117 12971 | 15Ω 5% 0603 0.62W   | 3943 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3314 | 4822 051 30103 | 10kΩ 5% 0.062W       | 3525 | 4822 051 30102 | 1kΩ 5% 0.062W       | 3A01 | 5322 117 11726 | 10Ω 5%              |
| 3315 | 4822 051 30101 | 100Ω 5% 0.062W       | 3526 | 4822 051 30759 | 75Ω 5% 0.062W       | 3A02 | 5322 117 11726 | 10Ω 5%              |
| 3316 | 4822 051 30103 | 10kΩ 5% 0.062W       | 3528 | 4822 051 30101 | 100Ω 5% 0.062W      | 3A03 | 4822 051 30682 | 6.8Ω 5% 0.062W      |
| 3318 | 4822 051 30101 | 100Ω 5% 0.062W       | 3529 | 4822 051 30101 | 100Ω 5% 0.062W      | 3A04 | 4822 051 30223 | 22kΩ 5% 0.062W      |
| 3319 | 4822 051 30103 | 10kΩ 5% 0.062W       | 3530 | 4822 051 30759 | 75Ω 5% 0.062W       | 3A05 | 2322 762 60229 | 22Ω 5% 1005         |
| 3320 | 4822 051 30101 | 100Ω 5% 0.062W       | 3531 | 4822 051 30759 | 75Ω 5% 0.062W       | 3A06 | 4822 051 30682 | 6.8Ω 5% 0.062W      |
| 3322 | 4822 051 30101 | 100Ω 5% 0.062W       | 3532 | 4822 051 30102 | 1kΩ 5% 0.062W       | 3A07 | 4822 051 30682 | 6.8Ω 5% 0.062W      |
| 3323 | 4822 051 30101 | 100Ω 5% 0.062W       | 3533 | 4822 051 30759 | 75Ω 5% 0.062W       | 3A08 | 4822 051 30223 | 22kΩ 5% 0.062W      |
| 3324 | 4822 051 30331 | 330Ω 5% 0.062W       | 3535 | 4822 051 30689 | 68Ω 5% 0.063W 0603  | 3A09 | 4822 051 30109 | 10Ω 5% 0.062W       |
| 3325 | 4822 051 30103 | 10kΩ 5% 0.062W       | 3536 | 4822 051 30102 | 1kΩ 5% 0.062W       | 3A11 | 4822 051 30682 | 6.8Ω 5% 0.062W      |
| 3329 | 4822 051 30101 | 100Ω 5% 0.062W       | 3537 | 4822 051 30102 | 1kΩ 5% 0.062W       | 3A12 | 4822 051 30105 | 1MΩ 5% 0.062W       |
| 3336 | 4822 051 30101 | 100Ω 5% 0.062W       | 3538 | 4822 051 30472 | 4.7Ω 5% 0.062W      | 3A13 | 4822 051 30393 | 39kΩ 5% 0.062W      |
| 3338 | 4822 051 30101 | 100Ω 5% 0.062W       | 3540 | 4822 051 30472 | 4.7Ω 5% 0.062W      | 3A14 | 2322 762 60229 | 22Ω 5% 1005         |
| 3339 | 4822 051 30101 | 100Ω 5% 0.062W       | 3545 | 4822 051 30101 | 100Ω 5% 0.062W      | 3A15 | 4822 051 30105 | 1MΩ 5% 0.062W       |
| 3340 | 4822 051 30101 | 100Ω 5% 0.062W       | 3546 | 4822 051 30759 | 75Ω 5% 0.062W       | 3A17 | 4822 051 30109 | 10Ω 5% 0.062W       |
| 3341 | 4822 051 30101 | 100Ω 5% 0.062W       | 3550 | 4822 051 30273 | 27kΩ 5% 0.062W      | 3A19 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3342 | 4822 051 30101 | 100Ω 5% 0.062W       | 3551 | 4822 051 30682 | 6.8Ω 5% 0.062W      | 3A26 | 4822 051 30223 | 22kΩ 5% 0.062W      |
| 3343 | 4822 051 30101 | 100Ω 5% 0.062W       | 3552 | 4822 051 30101 | 100Ω 5% 0.062W      | 3A27 | 4822 117 12891 | 220kΩ 1%            |
| 3345 | 4822 051 30101 | 100Ω 5% 0.062W       | 3553 | 4822 051 30759 | 75Ω 5% 0.062W       | 3A28 | 4822 117 12891 | 220kΩ 1%            |
| 3346 | 4822 051 30101 | 100Ω 5% 0.062W       | 3554 | 4822 051 30689 | 68Ω 5% 0.063W 0603  | 3A29 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3347 | 4822 051 30103 | 10kΩ 5% 0.062W       | 3555 | 4822 051 30689 | 68Ω 5% 0.063W 0603  | 3A30 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3348 | 4822 051 30479 | 47Ω 5% 0.062W        | 3601 | 4822 051 30759 | 75Ω 5% 0.062W       | 3A31 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3349 | 4822 051 30103 | 10kΩ 5% 0.062W       | 3603 | 4822 051 30759 | 75Ω 5% 0.062W       | 3B11 | 4822 051 30472 | 4.7Ω 5% 0.062W      |
| 3350 | 4822 051 30103 | 10kΩ 5% 0.062W       | 3605 | 4822 051 30759 | 75Ω 5% 0.062W       | 3B12 | 5322 117 13049 | 470Ω 1% 0.063W 0603 |
| 3351 | 4822 051 30332 | 3.3Ω 5% 0.062W       | 3607 | 4822 051 30151 | 150Ω 5% 0.062W      | 3B13 | 4822 051 30221 | 220Ω 5% 0.062W      |
| 3352 | 4822 051 30332 | 3.3Ω 5% 0.062W       | 3608 | 4822 051 30333 | 33kΩ 5% 0.062W      | 3B14 | 2322 704 61002 | 1kΩ 1%              |
| 3353 | 4822 051 30103 | 10kΩ 5% 0.062W       | 3611 | 4822 051 30151 | 150Ω 5% 0.062W      | 3B15 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3354 | 4822 051 30101 | 100Ω 5% 0.062W       | 3612 | 4822 051 30333 | 33kΩ 5% 0.062W      | 3B19 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3355 | 4822 051 30101 | 100Ω 5% 0.062W       | 3617 | 4822 051 30101 | 100Ω 5% 0.062W      | 3F10 | 4822 051 30331 | 330Ω 5% 0.062W      |
| 3356 | 4822 051 30101 | 100Ω 5% 0.062W       | 3618 | 4822 051 30101 | 100Ω 5% 0.062W      | 3F11 | 482            |                     |





|      |                |                      |
|------|----------------|----------------------|
| 7316 | 3198 010 42310 | BC847BW              |
| 7317 | 3198 010 42310 | BC847BW              |
| 7320 | 9340 560 36235 | BSH111               |
| 7321 | 9340 560 36235 | BSH111               |
| 7322 | 4822 130 11155 | PDTC114ET            |
| 7323 | 9322 246 85685 | NL27WZ08USG          |
| 7410 | 9322 198 11685 | L78L08ACU            |
| 7411 | 9322 243 36671 | MSP4450P-VK-E8       |
| 7500 | 5322 130 60159 | BC846B               |
| 7502 | 3198 010 42320 | BC857BW              |
| 7503 | 5322 130 60159 | BC846B               |
| 7504 | 3198 010 42320 | BC857BW              |
| 7810 | 9352 668 39118 | UDA1334ATS/N2        |
| 7811 |                | For SW see item 0822 |
| 7812 | 9965 000 04199 | BSN20                |
| 7813 | 9965 000 04199 | BSN20                |
| 7814 | 3198 010 42310 | BC847BW              |
| 7816 | 3198 010 42310 | BC847BW              |
| 7817 | 9322 245 55671 | SI9025CTU            |
| 7824 | 9965 000 04199 | BSN20                |
| 7825 | 9965 000 04199 | BSN20                |
| 7850 |                | For SW see item 0821 |
| 7851 | 9965 000 04199 | BSN20                |
| 7852 | 9965 000 04199 | BSN20                |
| 7860 | 3198 010 42310 | BC847BW              |
| 7861 | 3198 010 42310 | BC847BW              |
| 7901 | 9322 183 05668 | TS482ID              |
| 7902 | 3198 010 42320 | BC857BW              |
| 7911 | 3198 010 42310 | BC847BW              |
| 7912 | 3198 010 42310 | BC847BW              |
| 7913 | 3198 010 42310 | BC847BW              |
| 7914 | 3198 010 42310 | BC847BW              |
| 7915 | 3198 010 42310 | BC847BW              |
| 7916 | 3198 010 42310 | BC847BW              |
| 7917 | 3198 010 42320 | BC857BW              |
| 7919 | 3198 010 42310 | BC847BW              |
| 7922 | 3198 010 42310 | BC847BW              |
| 7A01 | 9352 796 42518 | TDA8932T/N1          |
| 7A05 | 3198 010 42320 | BC857BW              |
| 7A06 | 3198 010 42310 | BC847BW              |
| 7A07 | 3198 010 42310 | BC847BW              |
| 7B01 | 9322 202 34668 | L5973D               |
| 7B02 | 4822 209 17398 | LD1117DT33           |
| 7B03 | 4822 130 11057 | 2N7002               |
| 7B04 | 9322 175 62687 | LD1085D2T33          |
| 7B06 | 4822 209 17398 | LD1117DT33           |
| 7B08 | 9322 144 97668 | LD1117DT             |
| 7F01 | 9352 732 45557 | TDA10046AHT/C1       |
| 7F02 | 9352 630 16165 | 74AHC1GU04GW         |
| 7F03 | 9352 630 16165 | 74AHC1GU04GW         |
| 7F04 | 5322 209 70225 | LM393D               |
| 7G00 | 9352 773 55557 | PNX8314HS/C102       |
| 7H00 |                | For SW see item 0851 |
| 7H02 | 9322 241 27668 | K4S281632I-UC60      |
| 7H03 |                | For SW see item 0852 |
| 7J04 | 9322 214 00668 | SI2301BDS-E3         |
| 7J05 | 4822 130 11155 | PDTC114ET            |
| 7K00 | 9322 227 91671 | STV0700L             |
| 7K01 | 9352 190 10118 | 74LVC573ADB          |
| 7K02 | 9352 190 10118 | 74LVC573ADB          |
| 7K03 | 9352 115 40118 | 74LVC245APW          |
| 7K04 | 2722 171 08821 | XTL 27MHz 50pF       |
| 7K05 | 9322 175 13668 | ST890CD              |

Side I/O Panel [D]

Various

|      |                |                 |
|------|----------------|-----------------|
| 1301 | 4822 267 10484 | YKF51-5359      |
| 1302 | 2422 026 05808 | Cinch 3p f Ye   |
| 1303 | 2422 026 05059 | Connector Phone |
| 1304 | 2422 025 10655 | Connector 11p m |



|      |                |                   |
|------|----------------|-------------------|
| 2301 | 4822 126 11785 | 47pF 5% 50V 0603  |
| 2302 | 4822 126 11785 | 47pF 5% 50V 0603  |
| 2303 | 4822 122 33761 | 22pF 5% 50V       |
| 2304 | 4822 126 11785 | 47pF 5% 50V 0603  |
| 2305 | 4822 126 14238 | 2.2nF 50V 0603    |
| 2306 | 4822 126 14238 | 2.2nF 50V 0603    |
| 2307 | 2238 916 15641 | 22nF 10% 25V 0603 |
| 2308 | 2238 916 15641 | 22nF 10% 25V 0603 |
| 2309 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2310 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2311 | 3198 016 36890 | 68pF 50V 0603     |



|      |                |               |
|------|----------------|---------------|
| 3301 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3302 | 4822 051 30759 | 75Ω 5% 0.062W |

|      |                |                  |
|------|----------------|------------------|
| 3303 | 4822 051 30109 | 10Ω 5% 0.062W    |
| 3304 | 4822 051 30101 | 100Ω 5% 0.062W   |
| 3305 | 4822 051 30109 | 10Ω 5% 0.062W    |
| 3306 | 4822 051 30101 | 100Ω 5% 0.062W   |
| 3308 | 4822 051 30151 | 150Ω 5% 0.062W   |
| 3309 | 4822 051 30333 | 33kΩ 5% 0.062W   |
| 3310 | 4822 051 30151 | 150Ω 5% 0.062W   |
| 3311 | 4822 051 30333 | 33kΩ 5% 0.062W   |
| 3312 | 4822 051 30103 | 10kΩ 5% 0.062W   |
| 3313 | 4822 051 30103 | 10kΩ 5% 0.062W   |
| 4308 | 2422 549 42896 | Bead 120Ω 100MHz |
| 4309 | 2422 549 42896 | Bead 120Ω 100MHz |



|      |                |           |
|------|----------------|-----------|
| 6301 | 9322 146 61685 | DF3A6.8FU |
| 6302 | 9322 146 61685 | DF3A6.8FU |
| 6303 | 9322 146 61685 | DF3A6.8FU |
| 6304 | 9322 146 61685 | DF3A6.8FU |
| 6305 | 9322 146 61685 | DF3A6.8FU |
| 6306 | 9322 146 61685 | DF3A6.8FU |
| 6307 | 9322 146 61685 | DF3A6.8FU |

Keyboard Control Panel [E]

Various

|      |                |                    |
|------|----------------|--------------------|
| 1011 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 1012 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 1013 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 1014 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 1015 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 1016 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 1M01 | 2422 025 10775 | Connector 3p m     |



|      |                |              |
|------|----------------|--------------|
| 2001 | 4822 126 13881 | 470pF 5% 50V |
|------|----------------|--------------|



|      |                |                      |
|------|----------------|----------------------|
| 3010 | 4822 051 30391 | 390Ω 5% 0.062W       |
| 3011 | 4822 051 30561 | 560Ω 5% 0.062W       |
| 3012 | 3198 021 31820 | 1.8kΩ 5% 0.062W 0603 |
| 3013 | 4822 051 30151 | 150Ω 5% 0.062W       |
| 3014 | 4822 117 12968 | 820Ω 5% 0.62W        |
| 3015 | 4822 051 30008 | Jumper 0603          |
| 3016 | 4822 051 30008 | Jumper 0603          |
| 3017 | 4822 051 30008 | Jumper 0603          |
| 4001 | 4822 051 30008 | Jumper 0603          |



|      |                |             |
|------|----------------|-------------|
| 6011 | 4822 130 11564 | UDZ3.9B     |
| 6012 | 4822 130 11564 | UDZ3.9B     |
| 6014 | 3198 020 55680 | BZX384-C5V6 |
| 6015 | 3198 020 55680 | BZX384-C5V6 |
| 6016 | 3198 020 55680 | BZX384-C5V6 |
| 6017 | 3198 020 55680 | BZX384-C5V6 |
| 6018 | 3198 020 55680 | BZX384-C5V6 |

IR & LED Panel [J]

Various

|      |                |                   |
|------|----------------|-------------------|
| 1M01 | 2422 025 10775 | Connector 3p m    |
| 1M01 | 2422 025 18146 | Connector 3p m Wh |
| 1M20 | 2422 025 18151 | Connector 7p m Wh |
| 1M20 | 4822 265 41343 | Connector 7p m    |



|      |                |                    |
|------|----------------|--------------------|
| 2001 | 2020 552 00134 | 22μF 20% 6.3V 0805 |
|------|----------------|--------------------|



|      |                |                |
|------|----------------|----------------|
| 3010 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3011 | 4822 051 30682 | 6.8Ω 5% 0.062W |
| 3012 | 4822 051 30682 | 6.8Ω 5% 0.062W |
| 3013 | 4822 117 12968 | 820Ω 5% 0.62W  |
| 3014 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3019 | 4822 051 30151 | 150Ω 5% 0.062W |
| 3020 | 4822 051 30151 | 150Ω 5% 0.062W |
| 4001 | 4822 051 30008 | Jumper 0603    |
| 4002 | 4822 051 30008 | Jumper 0603    |
| 4004 | 4822 051 30008 | Jumper 0603    |
| 4005 | 4822 051 30008 | Jumper 0603    |

|      |                |             |
|------|----------------|-------------|
| 4010 | 4822 051 30008 | Jumper 0603 |
| 4012 | 4822 051 30008 | Jumper 0603 |
| 4015 | 4822 051 30008 | Jumper 0603 |
| 4017 | 4822 051 30008 | Jumper 0603 |
| 4019 | 4822 051 30008 | Jumper 0603 |



|      |                |                       |
|------|----------------|-----------------------|
| 6010 | 9322 243 77676 | LED L-174A2PBC        |
| 6011 | 9322 244 07676 | LED L-174A2IT-TNB5-19 |
| 6012 | 4822 130 11148 | UDZ4.7B               |



|      |                |             |
|------|----------------|-------------|
| 7010 | 9322 243 06671 | IR Receiver |
| 7011 | 5322 130 60159 | BC846B      |
| 7012 | 5322 130 60159 | BC846B      |

# 11. Revision List

- Manual xxxx xxx xxxx.0
- First release.